The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Experience at a Discount

A WELL-KNOWN commercial traveller, discussing the other day the prospects and condition of business, remarked that, considering all the circumstances, he was doing fairly well, but that all his trade seemed to be with young men. This remark was the more surprising seeing that the traveller himself was getting on in life, and might reasonably be expected to make rather more headway with men of his own age than with the coming generation. But further inquiries confirmed his affirmation. An analysis of his actual orders, his promises, and his prospects showed that the bulk of his turnover at the moment was coming not from old friends, established customers, but from the younger new people, men in the early prime of life. Firms with junior partners were fairly active; those with only seniors were disinclined to launch out. Old-established concerns with great reputations were cautious and backward; new firms and younger houses were responsible for such trade as was going.

Why should this be so? We remember years ago the legend "Too Old at Forty." Those were the days when the younger men were just beginning to assert their independence, when youth which, during the Victorian era, was rigidly suppressed for the good of its soul was beginning to share some of the responsibilities of the world, and when competition was so keen that the young and active were recognised as the best men for the game. But circumstances are very different to-day. There is a universal need for activity which is universally recognised; there is a crying aloud from the heart of all our industries for the application of every bit of experience and knowledge which we possess to get things, somehow or another, going on a prosperous basis. And yet, the older men, the men of ripe experience, hold back. The lassitude of war is certainly not an adequate reason. That, indeed, has almost passed. Both old and young are by now fully aware that the much advertised fruits of victory are nothing but the need for hard work, and still the older men hang back.

The real explanation is probably to be found in the burden of taxation. We have to face the fact that the man who has reached to an income of £2,000 or £3,000 a year has no longer any incentive to work. It is useless to call attention to the need; it is futile to point out that the work must be done. The risks are so great, the responsibilities so heavy, and the chances of success so remote, that when the penalty of a success is taxation at the rate of 12s. or 15s. in the £, even the highest sense of duty is not sufficient to induce the ordinary mortal to make the effort. The only people who can get an adequate reward for efforts made to-day are those who have not yet acquired an income which amounts to, say, £2,000 a year. The man with £1,000 can still hope to make it £1,500 without inordinate punishment. The man with £1,500 may still, if he is very energetic, think it worth while to push his earnings up to £2,000, but when he gets there, it being understood that every added hundred is more and more difficult, he will call a halt and say it is not worth while.

The pity of it is that the men of experience, the men with the big incomes, are the very men who are most badly wanted to-day; they are the people who, if with one accord they would put forward every effort of which they are capable, could do more than any other class to rid us of unemployment, and set us on our feet again. Yet, for the most part, they take no steps in that direction and no one is able to blame them. Some day or another we shall wake up to the folly of this system of suppressing enterprise. The crushing taxation of the bigger income is permitted by public opinion for two reasons—first, and least important, because the money is wanted; secondly, because the great bulk of the population still entertains the fallacious theory that the big income comes out of the pockets of the poor. It will not be long before the poor realise the futility of the committees, councils, and unions upon which they now rely with such implicit faith, and then public opinion will turn to the successful man and ask him, in the interests of all, to see what he can do to be still more successful.

Chemical Science and Engineering

We referred briefly last week to Mr. G. M. Gill's remarks in connexion with the co-operation of engineer and chemist. The subject is one of such considerable importance that no apology is needed for returning to it. Mr. Gill is well known as the chief engineer of one of our largest gas undertakings and it is moderately easy to gather from his paper that he thinks with the mind of a practical engineer, and may not, therefore, quite appreciate the full sense of the chemist's *rôle* as a co-equal and not merely an auxiliary. It will be agreed that of all so-called engineering processes there is none more closely interwoven with chemistry than that associated with the carbonisation of coal and the working-up of subsidiary products. The gas engineer, therefore, must be capable of attacking problems both as an engineer and as a chemist, and the sooner he realises that he is essentially a "chemical engineer," the sooner will he be able to quell the rather prevalent opinion that the gas industry is run not on scientific but on rule-of-thumb methods.

So far as the carbonisation of coal for the production of coal gas is concerned it might almost be said that from the engineering standpoint something approaching perfection has been reached; but as regards the chemical aspects of the subject, we are still comparatively unlearned, and a great deal of useful research remains to be accomplished in such directions, for instance, as the secondary decompositions and interactions of primary distillation products. As an example of what can be accomplished when the academic mind is applied to problems of the kind, reference may be made to the recent work relating to the simultaneous production of coal gas and water gas at the Fuel Research Station at East Greenwich. The data evolved in connexion with the steamed coal charge in continuous vertical retorts are of an importance sufficient to act as a considerable stimulant to carbonisation on these lines, and they should be of no mean use in assisting those in authority in gasworks to come to a decision when selecting plant for extensions.

Mr. Gill must certainly be given credit for having started discussion upon a problem which can only be threshed out by thorough ventilation of the views of both sides. It now remains for others to carry on the story where it has been left, and—as the gas industry provides such an admirable starting ground—we would suggest that one of the recognised gas chemists should take up the subject, so that those who are anxious to see a welding of the two interests definitely accomplished might have an opportunity of learning how the problem would be attacked from a different point of view.

The "Fine Chemical" Problem

No one could have listened to the discussion at the Chemical Industry Club on Monday evening on the now familiar question, "What is a Fine Chemical?" without being forced to the conclusion at which the principal speaker, Mr. Woolcock, had already arrived, that no definition could be framed at once so comprehensive and so scientifically exact as to meet with universal acceptance. This fact, once admitted, disposes of all criticism both of the draughtsmanship of the Act and of the composition of the Board of Trade List, for it implies that both the draughtsman and the compilers were attempting an impossible task, and that the defects inevitable in such an attempt were only to be expected. It has not, so far as we know, been suggested that the defects form an excessive proportion to the whole, and the Act, therefore, remains substantially unaffected.

In dealing with the general principle on which both the Dyestuffs and the Safeguarding of Industries Acts are based, it is difficult to resist an argument put with so much tact and moderation. The case which Mr. Woolcock presented was the more persuasive because he made in advance all the concessions possible to opponents, and because he rigidly confined his claims to the absolute minimum of what is necessary to secure the end in view. Theoretically, no doubt, this country is as thoroughly Free Trade as it used to be. Mr. Woolcock himself accepts the principle in the abstract as fully as he did before the war, and any general dependence on fiscal devices for the permanent success of British industries would, in our view, be ruinous. But there is one practical consideration which the most thorough, if honest, Free Trader cannot ignore. During the war it is beyond dispute that large sums of money were invested in the establishment of new or the extension of existing industries in order to supply immediately urgent needs and to guarantee the future independence of this country. That work was undertaken on definite pledges that such industries would receive special consideration for some period after the war, and whatever minor defects there may be in our methods of fulfilling these pledges, the pledges themselves must be kept. That, we think, is as far as Mr. Woolcock meant to go, and it is very difficult to see how, with any reasonable regard for equity, the nation can stop short of it.

A Chemical Engineering Library

In the advance spring list of technical, art, and general books published by Benn Brothers, Ltd. (publishers of The Chemical Age) fuller particulars are given of the firm's Chemical Engineering Library, of which mention was made some time since. Already arrangements have been made for the publication of the following nine monographs, to be shortly followed by further issues:—

1. "The General Principles of Chemical Engineering Design," by the General Editor.
2. "The Lay-out of Chemical Works," by Hugh Griffiths.
3. "Materials of Construction: I. Non-Metals," by Hugh Griffiths.
4. "Materials of Construction: II. Metals," by Hugh Griffiths.
5. "Mechanical Handling," by Alexander Reid.
6. "Weighing and Measuring Chemical Products," by Malan and Robinson.
7. "Flow of Liquid Chemicals in Pipes," by Norman Swindin.
8. "Chemical Works Pumping," by Norman Swindin.
9. "Factory Wastes as Fuels," by Alexander Reid.

These volumes, of a convenient 8vo size with numerous illustrations, will be issued at the modest figure of 3s. each, and already a wide circulation is promised. In their compilation an attempt has been made to keep in view the needs of the chemical engineer, the research chemist, the managing works chemist, the engineer, and the manufacturer, and to give within the smallest space a truly scientific and practical treatment of each subject.

Research and Commerce

DR. HERBERT LEVENSTEIN, in a comprehensive review of the dyestuffs industry in the *Yorkshire Post Trade Review*, calls attention once more to the close sympathy which for years has existed in Germany between research and commercial interests. The employment of research in Germany is described as not a fad nor a luxury, but purely a business proposition. The moral, of course, is that the development of chemical research in this country in the dyestuffs or any other branch of industry will produce little result unless supported by commercial concerns with large technological resources and prepared to take risks. The discovery of a new substance or reaction—the work of the research chemist—is but the first step in the process of making inventions commercially successful; the other two are the recognition that the invention possesses properties of value for a certain purpose and successful manufacture on a large scale. Dr. Levenstein points to the Haber and the Heumann processes as examples of discoveries of purely scientific interest being converted by technologists employed by large commercial interests into processes of world-wide commercial value.

"Does anybody," he asks with a touch of irony, "think that the indigo or the Haber ammonia process, or thirty other inventions which I could mention, would have appeared valuable in their original undeveloped state to any British business man? No. The recognition in the early stage that the laboratory reaction might be made to pay and the ability to develop the process are two separate but essential parts of these inventions. How absurd, therefore, to think that a research department is of the least commercial value unless behind it are those with the technical knowledge, imagination, and insight to recognise a potentially commercially valuable process in a laboratory preparation, and unless there are technologists to develop the idea and a great sales department to create a market."

An Appeal to Business Men

MR. ERNEST BENN, in an article in this issue, makes an interesting suggestion to business men with a view to lightening the burden of taxation on themselves, and using this as a means to promote trade and diminish unemployment. The present figures of taxation are—Income tax, 6s.; Excess Profits Duty, 80 per cent.; Corporation Tax, 5 per cent; Rates, 15s. to 30s. Assuming that Income Tax could be reduced by 1s. 6d., the Excess Profits and Corporation duties abolished, and rates reduced by 5s., Mr. Benn estimates that this would leave in the hands of business men a total sum of 250 millions which, instead of being paid into the Exchequer, would remain in business and be available for employment. Put into a concrete form, this might prove an effective argument for the reduction of taxation, and Mr. Benn invites those of our readers who are interested to co-operate in a simple and practical way, namely, by going into their taxation figures and estimating how many additional hands they could employ if the reductions he suggests were effected. If any considerable body of business people took the trouble to work out this sum, the information would be of great economic interest, and it might succeed with the Chancellor of the Exchequer where the best theoretical arguments would fail.

Points from Our News Pages

In his third article on modern chemical theories, Dr. Stephen Miall deals with "Isotypes" (p. 66).

Mr. W. J. U. Woolcock, M.P., reviews the controversy as to the definition of a fine chemical in an address to the Chemical Industry Club (p. 69).

Correspondence is published from G. C. Calvert ("Power Alcohol") and W. R. Fairbrother ("Income Tax Allowance") (p. 68).

Mr. E. J. B. Benn discusses the bearing of a general election on trade and especially the problem of national economy (p. 75).

The Board of Trade returns for December last indicate substantial increases in the export of certain chemicals, notably sodium sulphate and sodium caustic. There was a considerable increase in the imports of synthetic indigo (p. 73).

At a meeting on Monday of the Committee which is inquiring into the case of the imposition of a duty on imported glassware, it was announced that there would be no further public sittings (p. 72).

The application of super-centrifugal force to the clarification of varnish and the dehydration of oils was discussed at the last meeting of the Oil and Colour Chemists' Association (p. 71).

The results of further experiments to ascertain the fertilising value of activated sludge were described at the London Section of the Society of Chemical Industry (p. 73).

According to our London Market Report, trade is still quiet, with signs, however, of a broadening demand. Values are described as steady and the undertone as very firm (p. 81).

Our Scottish Market Report records rather more inquiries but a small volume of business placed (p. 83).

The Calendar

Jan. 21	London County Council: "Yeast, What it is, and What it Does." A. Chaston Chapman.	
24	Institute of Industrial Administration: "Industrial Economics." J. M. Fells. 8 p.m.	School of Economics, London.
24	Royal Institution of Great Britain: "Physiology as Applied to Agriculture." Professor F. H. A. Marshall. 9 p.m.	Albemarle Street, Piccadilly, London.
25	Institute of Chemistry, London and South-Eastern Counties Section: Exhibition of Apparatus other than Glassware. 6 p.m. to 10 p.m.	30, Russell Square, London.
26	Royal College of Science Chemical Society: "The Rare Gases." Professor N. Collie.	Royal College of Science, S. Kensington.
26	Society of Dyers and Colourists, Bradford, Junior Branch: "Some Finishing Defects." A. N. Hay.	Bradford.
26	Royal Society: Papers by Professor W. A. Bone, Sir E. Rutherford, and others.	
27	Society of Chemical Industry, Glasgow Section, and Chemical Engineering Group: "Potential Developments in Refrigeration." Dr. W. R. Ormandy and E. C. Craven.	Glasgow.
28	West Yorkshire Metallurgical Society: General Meeting and Debate: "That Physical Testing is the Duty of the Metallurgist rather than the Engineer." 6.30 p.m.	Y.M.C.A., Huddersfield.

Notes on Some Recent Chemical Theories

III.—Isotopes

By Dr. Stephen Miall

We have already shown how negative charges of electricity are included in atoms and how the loss of these influences the chemical nature of the atom, although the weight of the

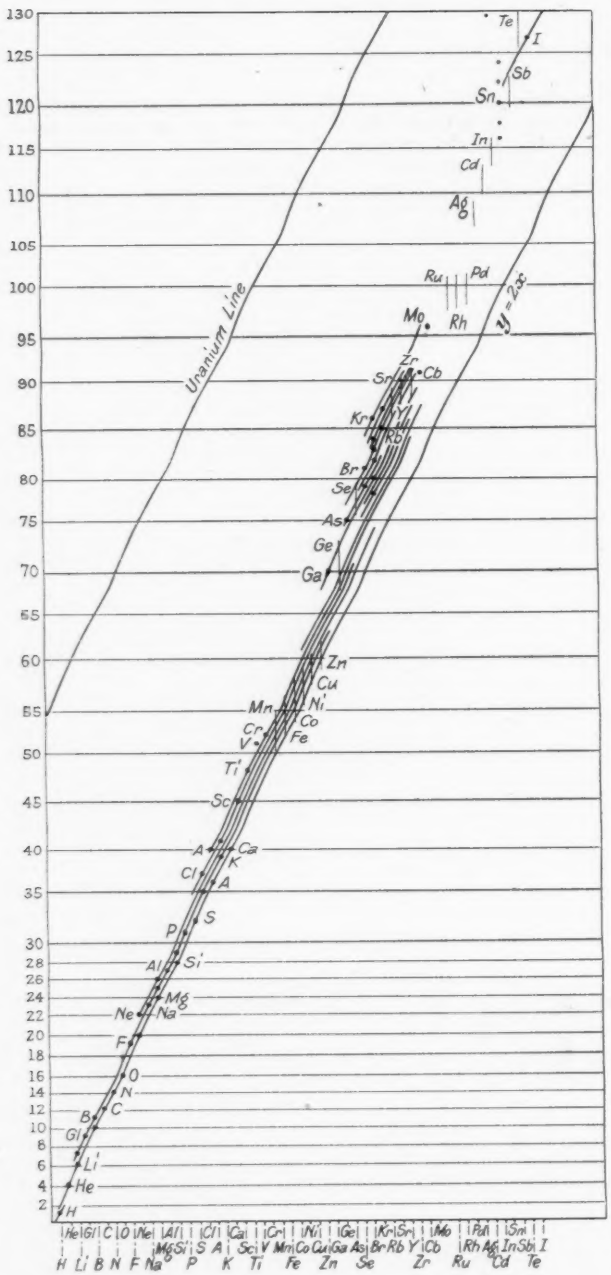

FIG. 3

atom is only affected to a very trifling extent. But the positive charges of electricity have also to be considered, and the meaning of positive rays was first explained by Sir J. J. Thomson. When cathode rays are formed the electrons are violently ejected in one direction, and there is naturally a sort of recoil. If the cathode is suitably provided with holes or channels the particles which recoil may be brought under observation, and the handiest way of doing this, the way first employed by Sir J. J. Thomson, is to deflect these particles by an electric or magnetic field and then allow their path to be determined by their photographic effect. The electric or magnetic field pulls the particle out of its straight path just as the force of gravity pulls down a bullet discharged from a gun-barrel, and in each case a parabolic curve results. The amount of deflection depends on the mass of the particles concerned and by the measurement of these parabolas Thomson was able to calculate roughly the masses of these different positive particles or positive rays, and it seems that the particles usually consist of molecules, or, if not molecules, they consist of associations of one atom, two atoms, three atoms, and so on. By comparing the curves of some well-known bodies a rough set of data was provided from which the mass of individual atoms of other substances could be approximately calculated. Thomson was able to show that neon gave two curves, and he concluded that neon had two sorts of atoms whose masses differed—that is to say, there were two isotopes of neon.

Dr. Aston, of Cambridge, has continued this investigation by new and greatly improved methods, and has been able to deflect the rays both by electric and magnetic fields and to concentrate the resulting rays so that they impinge on a photographic plate, producing lines comparable with an ordinary spectrum. From these mass spectra he has been able to calculate with an accuracy of about one in a thousand the mass of the atoms, and where an element is composed of isotopes each isotope gives a separate line, and the relative strength of these enables the observer to calculate roughly the proportion in which the isotopes exist. Aston has shown that the mass of the hydrogen atom is 1.008, that of helium is 4.00; lithium has two isotopes of masses 6 and 7; boron consists of two isotopes with masses of 10 and 11; carbon has a mass of 12; nitrogen is exactly 14; oxygen is taken as the standard at 16; fluorine is 19; neon consists of two isotopes of 20 and 22; sodium is 23 exactly; silicon has two isotopes, 28 and 29, and possibly another; phosphorus is 31 exactly; sulphur is probably 32 exactly; chlorine has two isotopes, 35 and 37; argon has two, 36 and 40; potassium has two isotopes, 39 and 41; arsenic has an atomic weight of 75 exactly; bromine has two isotopes, 79 and 81; krypton has six isotopes, 78, 80, 82, 83, 84, and 86; rubidium has two isotopes of 85 and 87 respectively; tin is probably a mixture of isotopes of masses 116, 118, 120, 122, and 124, while iodine is 127 exactly; xenon is a mixture of isotopes of values 128 ?, 129, 130 ?, 131, 132, 134, and 136. Cæsium is simple like iodine, and the atomic weight is 133 exactly. The mercury isotopes are 197 ?, 200 ?, 202, and 204. Dempster has found that magnesium consists of three isotopes with masses of 24, 25, and 26. Aston is now investigating the atomic weight by a spectroscopic method depending on a heated anode and it looks as if most of the elements will eventually succumb to the drastic methods he has been able to devise. Meanwhile the diagrams 3 and 4 show the atomic weights of the various elements and isotopes plotted against their atomic numbers. It is interesting to notice that in the elements of lower atomic weights there are no atoms or isotopes differing in chemical composition and having the same atomic weights. This is shown below, where the

possible atomic weights from 1 to 41 and from 75 to 90 are shown with the now known isotopes :

1 (H 1.008)	12 C	22 Ne	32 S
2	13	23 Na	33
3	14 N	24 Mg	34
4 He	15	25 Mg	35 Cl
5	16 O	26 Mg	36 A
6 Li	17	27	37 Cl
7 Li	18	28 Si	38
8	19 F	29 Si	39 K
9 Gl	20 Ne	30 ? Si	40 A
10 B	21	31 P	41 K
11 B			

75 As	79 Br	83 Kr	87 Rb
76	80 Kr	84 Kr	88
77	81 Br	85 Rb	89
78 Kr	82 Kr	86 Kr	90

On the other hand, among the radio-active elements a number of different atoms with similar atomic weights are known thus : Radium, actinium, and radio-actinium all have atomic weights of 226 ; thorium D, one of the isotopes of lead, and bismuth all have atomic weights of 208. It must be remembered, however, that almost all these are unstable elements which, after a somewhat dissipated career, eventually settle down as dull and steady metals, such as lead, a metal whose respectability is characteristic also of those who make a precarious livelihood out of its compounds.

In these diagrams 3 and 4 a vertical line indicates that the atomic weights of the isotopes are not known, and other corrections will also be forthcoming. He, Li, B, C, N, O, Ne, Mg, Si, S, A, and Ca, all have isotopes on the line $y = 2x$, and no element except hydrogen, which is in other respects quite exceptional, has one on any lower line. This line $y = 2x$ seems to me to be quite fundamental, and all above the line does not affect the game of chemistry any more than the odd fifties and hundreds above the line affect our chances of winning a rubber at bridge. Now these units above the line which are chemically inert are capable of being enlivened. Let us consider UX_1, which has an atomic weight of 234 and an atomic number of 90 ; this will have 90 positive charges associated apparently with a minimum nuclear mass of 180 and as much more mass as you like within reasonable limits. With an atomic weight of 234 it has 54 units of this valueless mass, just as uranium has. Now it can lose two β-particles forming U_{II}, with an atomic weight of 234 and an atomic number of 92 and a minimum nuclear mass of 184 and 50 units of dead weight. The effect of losing two β-particles is therefore to convert 4 units of dead weight into weight which counts in deciding the chemical nature of the element.

The X-ray radiations have been worked out by Barkla, Moseley, Bragg, and others, and as diagram 5 shows they are of three kinds, the K series which extends from sodium to tin, the L series which extends from zinc to uranium, and the M series which extends from gold to uranium. It is believed that the ring or sphere of electrons next outside the nucleus gives rise to the K series, the next ring or sphere of electrons gives rise to the L series and the third one to the M series, and it has been suggested that each ring is fairly stable when formed, and that when completed the next electrons added to the atom take up a position on a new external sphere. When we come to the element neon we are approaching the element whose K ring is nearly or quite complete. Langmuir considers that neon has 2 internal electrons forming part of the K ring and 8 external electrons, completing the condition of stability, and so depriving the element of any valency. Vegard, on the other hand, considers that the atom of helium has 3 inner electrons forming the K ring and 7 outer electrons which form the L ring. Neon has an atomic number of 10, and the isotope, with atomic weight of 20, has a mass of 20 with 10 positive charges ; the isotope with atomic weight 22 has a mass of 22 with 10 positive charges. Sodium has presumably a nucleus of mass 23 with 11 positive charges,

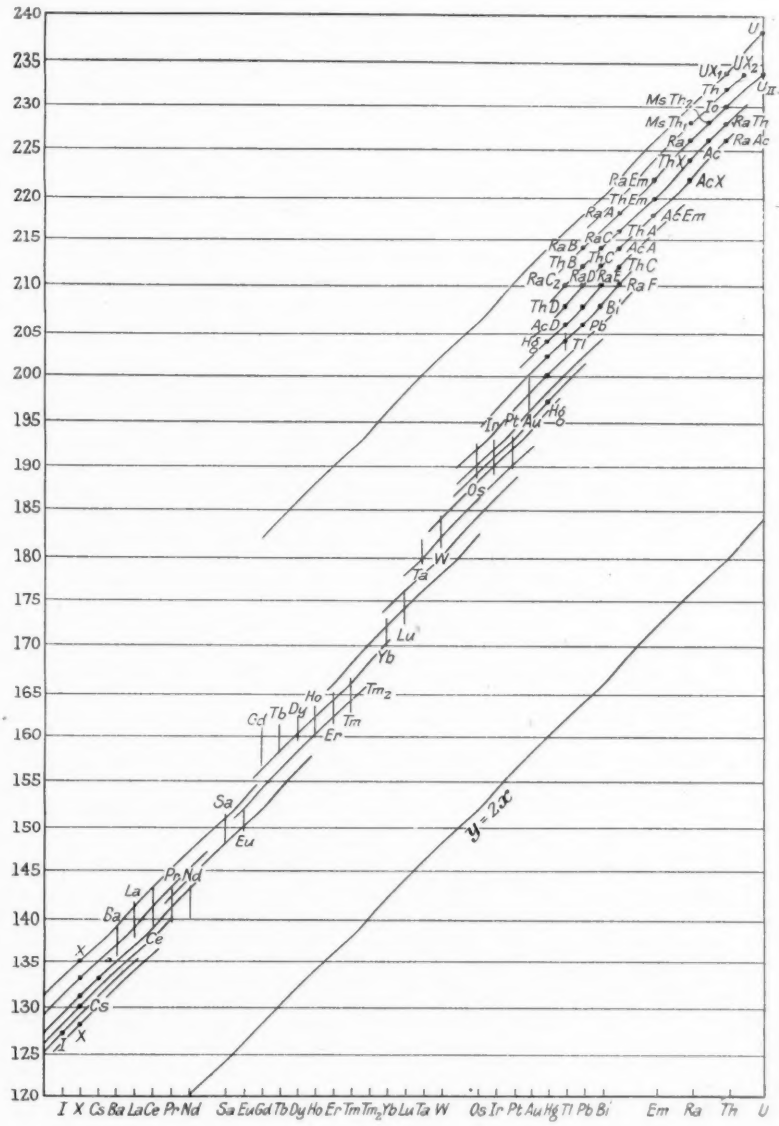

FIG. 4.

and in addition the atom has 11 electrons, 3 on an inner ring, 7 on the next ring, and 1 external electron giving a valency of 1. The next elements add on 1 external electron until we come to argon, when the outer ring of 8 is completed, and potassium begins a new ring with 1 external electron. The next elements continue to add 1 external electron until we come to iron with 8 external electrons and a valency of 8. Cobalt adds an electron without alteration of valency, so that this electron should be added inside the outer sphere. Vegard supposes it to be added to the adjoining ring, the ring giving rise to the M series of the X radiation, making 9 electrons in that ring. Nickel adds another electron to the same ring, and then a new series commences with copper having 1 electron on a new external ring or sphere.

The isotopes of the next elements until we come to bromine are not known. But bromine is a mixture of two isotopes of 79 and 81 mass respectively, and these according to the diagrams have 9 and 11 units respectively of dead weight. Vegard who treated bromine as having an atomic weight

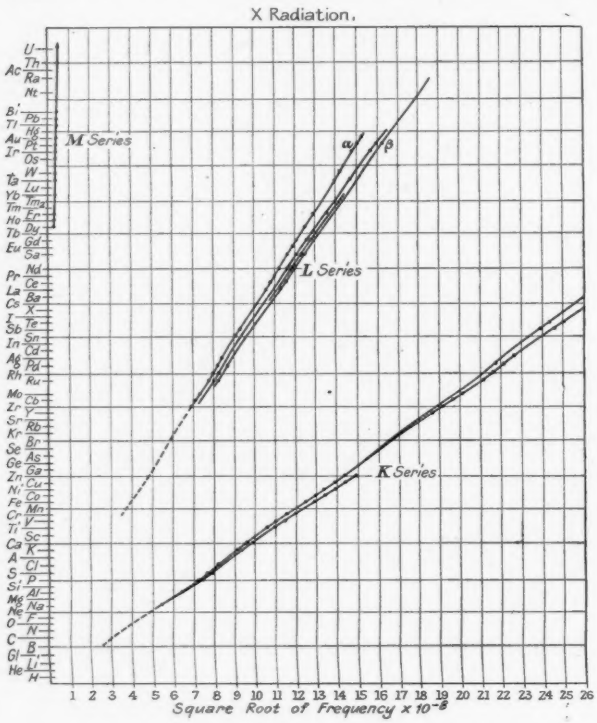

FIG. 5.

of 80, considered it as having 5 electrons on the nucleus, making 10 units of unelectrified matter, but this seems hardly to fit the facts as now known. The isotope of krypton with atomic weight 86 has an atomic number of 36, a nucleus of mass 86 (72 units positively electrified and 14 dead) and 36 electrons of which 8 form the external sphere. The remaining elements, until we come to the radio-active ones, can be traced more or less on similar lines, but as the weights of most of the isotopes are not known the structure of their atoms must be even more conjectural than those already put forward. It is not clear from the above suggestions why iron with 8 external electrons should be chemically active, while argon and xenon with 8 external electrons should be inert. Langmuir has put forward an ingenious theorem to account for this and some other anomalies, but I will not try and explain it here. When I read his own words I think I understand and accept his hypothesis, but when I try and put it into plain language I am not sure whether I understand it at all. It may be that future researches will make it easier for us ordinary people to grasp the difficult features, and until then the only way to cover up our lack of intelligence is to assume that we and our readers understand it, and that we could put it into simple language if we took the trouble. The Athanasian Creed requires an intellect with a similar attitude.

When we come to xenon we have a landmark to guide us. Xenon surely has 54 electrons, 8 on the outside and 46 in rings or spheres inside, and the next element, cæsium, begins a new outside sphere. Barium comes next, and then we begin the rare earth elements with valencies usually of 3, sometimes possibly 4 and 5; as to these Langmuir considers they go on increasing the number of external electrons until they reach 18. It may be so. But if someone were to suggest that the number of external electrons remained 3, 4, or 5, and that the additional electrons were put somewhere inside, it seems to me that one might scoff at the suggestion, but it would be hard in our present state of knowledge to disprove it. The rare earths always have been an unmitigated nuisance in the periodic table, and although they fit in quite comfortably in any function of atomic numbers it is best to slur over them when dealing with a valency which is supposed to increase with every element and hope that some day some explanation will come along. Mercury with 78 internal electrons and 2 external ones is followed by thallium with 78 inside and 3 outside, lead with 78 inside and 4 outside, bismuth with 78 inside and 5 outside, radium A with 78 inside and 6 outside, a missing element with 78 inside and 7 outside, and then niton with 78 inside and 8 outside. So we come gradually to uranium with 86 inside and 6 outside, which completes the tale.

Hydrogen has some singularities. Its atomic number is 1, its mass is 1.008, its valency is 1, and one must conceive of it as having a nuclear mass and 1 external electron. Now the nucleus of helium is almost certainly the equivalent of 4 hydrogen nuclei, and the interaction of these brings about a reduction in their inertia or mass from 4.032 to 4.00. No substance is known with a nuclear mass of 2 or 3, and it seems from the list of atomic numbers that no element ought to be found between hydrogen and helium.

Rutherford, by allowing α-particles travelling at a high speed to hit nitrogen atoms, seems to have succeeded in breaking them up and forming hydrogen atoms, and last year (1921) Rutherford and Chadwick have announced the liberation of hydrogen atoms from boron, fluorine, sodium, aluminium, and phosphorus as a result of bombarding these by α-particles.

Income Tax Allowance

To the Editor of THE CHEMICAL AGE.

SIR,—There are many complaints of the burden of taxation, but I fear the taxpayers themselves do not always verify the correctness of the amount demanded. The income tax demand notes now being received should be carefully checked with the notices of assessment previously issued, to ensure the correct amount being paid.

If the individual taxpayer verifies the following he may feel that he has escaped overcharge, viz., earned income tenth, personal allowance £225 (married) or £135 (single), wife allowance to £45 on earnings, children allowance £36 (first) and £27 (subsequent), housekeeper allowance £45, widowed mother £45, dependent relative £25, first £225 taxable at 3s., life insurance premiums 3s. to 6s. per £, wear and tear of plant and machinery, average assessment if subordinate company employee, and expenses wholly and necessarily incurred.

Yours, &c., W. R. FAIRBROTHER.

67-68, Cheapside, E.C.2, January 17, 1922.

Power Alcohol

To the Editor of THE CHEMICAL AGE.

SIR,—With reference to the recent Fuel Research Board report on alcohol, your readers will be interested to learn that scale model plants at work here are making ethyl alcohol from water gas mixtures at the rate of 1 gallon of ethyl alcohol per 1,000 ft. of gas, and that there is every indication that this efficiency will be greatly increased on large-scale plants. The process is extremely simple and works consistently under all conditions likely to be met with in practice.—Yours, &c.,

Metropolitan Laboratories, January 16. G. C. CALVERT.

What is a Fine Chemical?

Mr. Woolcock Reviews the Position

At the Chemical Industry Club, London, on Monday evening, a large and keenly interested meeting of members listened to an address by Mr. W. J. U. Woolcock, M.P., on "Experiments in Protection, or What is a Fine Chemical?" Mr. A. G. Craig presided.

Experiments in Protection

Dealing with the first part of his subject. Mr. Woolcock pointed out that while most people in this country were still in theory free traders, a large number recognised that in the present abnormal conditions something must be done to safeguard British industries. There were three general methods of affording protection, and they all offered to the debater who desired that neither should be tried, the advantage that he could always argue that either of the other two was preferable to the one proposed. When the Dyestuffs Act, which introduced the method of protection by license, was before the House its opponents affirmed that even a tariff was better than licenses. When the Safeguarding of Industries Act, which introduced a tariff system, was under discussion, the same critics claimed that the only satisfactory solution was by subsidy. In each case the only course was to select the method which promises to attain the desired object with the least degree of harm to other interests.

The determining factor in the selection of the licensing method for the dyestuff industry was the fact that they had an organised compact body of consumers. Why was this the determining factor? Because when establishing an industry, a constantly recurring situation arose in which the home manufacturer began to make a foreign product but was unable to supply the total home demand at once. In these circumstances a certain amount of the foreign product must continue to be admitted. The problem then arose—which of the home consumers was to get the home product and which the foreign? Those who put forward their demands early got the home product, while those who delayed got the foreign. But if they had an organised compact body of consumers the total quantity of home and foreign products could be allocated fairly by their governing body among the individual consumers. On the other hand, where the consumers in the industry it was desired to protect are not an organised compact body, such as the glass, fine chemical, and other scientific industries, a licensing system would break down, as was shown during the war, owing to the impossibility of dealing equitably with the scattered unorganised consumers. It was this grave disadvantage which induced many who disliked a system of tariffs to accept it as less harmful and easier to work in the Safeguarding of Industries Act.

What is a Fine Chemical?

There were very few chemists who, if asked a year ago if they knew what a fine chemical was, would have hesitated to answer in the affirmative. To-day, thanks to our expert witnesses and our lawyers, there were few prepared to define the term "fine chemical" with any degree of certainty that the definition would be generally accepted. In the Safeguarding of Industries Act the Parliamentary draughtsman—wise even beyond his usual wisdom—included the following section in the schedule of classes of articles coming within Part 1. of the Act:

> "All synthetic organic chemicals (other than synthetic organic dyestuffs, colours, and colouring matters imported for use as such, and organic intermediate products imported for their manufacture) analytical reagents, all other fine chemicals (except sulphate of quinine of vegetable origin) and chemicals manufactured by fermentation processes."

Having done this, he made provision for the Board of Trade to issue a definitive list of particular articles included in these classes, and further provided for interested parties a power of appeal against the decision of the Board. The only other course which had ever been suggested was to include each particular item in the Act itself, but the House of Commons had not so lost all sense of proportion as to spend months in discussing a lengthy schedule of very technical articles concerning which an enormous majority of its members could know nothing. There was no other way, therefore, than to include in the Act a general description of what was intended by Parliament, and to leave the particular items to be set out by a Government Department, subject to all the limitations which the wording of the schedule imposed, and with sufficient safeguards so that if any mistakes were made they might be rectified.

Had there been a possible definition of a "fine chemical" the Parliamentary draughtsman would have included it. Up to the present time no expert had come forward with a form of words which expressed more concisely or more accurately what it was intended to include under the heading under discussion. He was inclined to think that a "fine chemical" was not susceptible of definition in the ordinary sense. Yet most people engaged in the manufacture of fine chemicals knew what was meant by the phrase. The learned referee in the santonine case thought that the first step to be taken was to ascertain the sense in which the word "chemical" was used in the schedule. He took the view that he was giving effect to the intention of the Legislature if he held that the word "chemical" was a substance manufactured by skilled chemical processes or a substance primarily used for the purpose of chemical reaction. A special committee on the Safeguarding of Industries Act appointed by the British Association of Chemists had submitted the following suggested definitions:

> "Chemical": A manufactured article not being a food or drink whose commercial value is not mainly dependent on its form.
>
> "Fine Chemical": A chemical of restricted use prepared especially for that use."

An objection had been taken to this definition because of the use of the word "manufactured" as difficult of definition. There was nothing, in his opinion, to exclude tobacco from the first of these definitions. Mr. Parry, in the santonine case, defined a chemical as a body which had either been brought into existence by artificial chemical action or was itself used as a chemical agent for the purposes of chemical action. This restricted view, although accepted by the referee, was not, he thought, likely to obtain general recognition. A better example of what the Legislature had in mind when using the phrase "fine chemicals" could be found in the schedule itself. Parliament evidently contemplated that "all fine chemicals" included various chemicals of vegetable origin and wishing to exempt sulphate of quinine of vegetable origin from these, deliberately so excluded it. If Parliament had not had such substances as santonine, atropine and caffeine in mind, why did it expressly exclude sulphate of quinine? He preferred a definition of Mr. C. A. Hill's, which seems to be more accurate from a scientific point of view. It was as follows:

> "A chemical is a substance capable of being prepared in a pure state and when so prepared it becomes an entity and has definite properties dependent upon its molecular structure, so that any specimen of a given pure chemical will have the same molecular structure and the same properties dependent thereon as every other specimen."

Or, stating it more shortly, "a chemical is a substance whose molecules are all alike."

If that definition of a chemical was accepted he would pass to the definition of a "fine chemical," and he expressed a preference for his own definition as published in the *Times Trade Supplement*. It was:

> "A fine chemical is one which (1) is usually made in small quantities relatively to heavy chemicals; or/and (2) is of an exceptionally high degree of purity, or otherwise of special quality; and (3) requires skilled supervision in its manufacture."

It had been urged against this definition that it was a recital of attributes and not a definition at all, but a definition was, according to a dictionary, "a brief description of a thing by its properties." Emphasis had also been laid on the use to which the chemical was to be put in determining whether it was a fine chemical or not. With that he disagreed. A chemical either had or had not inherent in its methods of manufacture the qualities which made it a fine chemical, and he could not see that a definite and restricted use could be taken as the acid test of "fineness" or otherwise.

In conclusion, he suggested that as the term "fine chemical" was not a scientific term but a well-understood trade term, no strictly scientific definition of it could be given and that the nearest approach to it was: "A substance whose molecules are all alike, which is usually made in small quantities relatively to heavy chemicals or/and is of an exceptional degree of purity or otherwise of special quality and requires skilled supervision in its manufacture."

A discussion (which it is the rule of the club to treat as private) followed and the meeting closed with a vote of thanks to Mr. Woolcock.

History of Rubber Vulcanisation

Paper by Dr. P. Schidrowitz

At a meeting of the Institution of Rubber Industry, held on January 11 at the rooms of the Royal Society of Arts, London, Dr. P. Schidrowitz read a paper on "Vulcanisation—Past, Present, and Future." The substance of this paper is given below :—

A few years ago the manufacture of a suitable definition for the process of rubber vulcanisation would not have involved any considerable difficulty. Most of us would probably have said that vulcanisation constitutes the reaction which takes place between rubber and sulphur or a sulphur compound, having in mind a definite chemical reaction. Although we still know comparatively little about the true inwardness of the chemistry and physics of vulcanisation we do know that it is not a simple or a definite chemical reaction. A definite chemical reaction, such as the formation from hydrogen and chlorine of hydrochloric acid, or from calcium and oxygen of quicklime, involves the combination, invariably and under all conditions, of definite weights of both constituents. If we take a mixing made with (an average) rubber and sulphur only and vulcanise it, we find that approximately 100 parts of rubber will combine with 2.5 to 3 parts, of sulphur before correct curing is attained. If to the same mixing we add a minute quantity—say ¼ of 1 per cent., or even less—of a violent accelerator, we can obtain a fully vulcanised product, according to factory standards, with a proportion of "combined" sulphur of as little as 0.5 or even less per 100 parts of rubber. Physically and mechanically, the products will not be identical, but they are both fully cured, and the re-action, which has taken place, cannot be the same in both instances. Naturally, these phenomena open the door to much speculation. We might suggest—as Weber suggested in regard to cold curing—that there are a series of possible rubber-sulphur compounds, each definite and corresponding to a "full" cure, but differing according to the conditions obtaining during vulcanisation. Such a theory necessarily involves the assumption of polymerising or aggregating effects varying according to the nature of the catalyst or accelerator. It has already been suggested that sulphur is merely a catalyst or polymerising agent and that an accelerator merely exercises the same type of effect as the sulphur, but in a much higher degree, but, in reply to this theory, it may be pointed out that so far we cannot do without the sulphur, and that the accelerator alone (provided it does not, as is the case with some of the super-accelerators described by Professor Bruni, contain sulphur capable of liberation at vulcanising temperatures) will not produce the vulcanising effect. I prefer, therefore, to define vulcanisation mainly in terms of its effects as a process involving the interaction of rubber and of sulphur (or sulphur compound) which profoundly modifies and improves the thermal and physical properties of the rubber.

British and American Practice

Until comparatively recent times, there was a wide difference of practice as between British and United States manufacturers in regard to the quantity of sulphur employed. American manufacturers worked with comparatively small quantities of sulphur, their British colleagues with comparatively large amounts. The former method involves the use of somewhat higher curing heats and/or more of the well-known catalysts, the latter of lower temperatures and/or less in the way of accelerators, mineral or otherwise.

In this connexion I have often wondered whether it might not be that, as regards life of the goods, the American practice is not more suitable to their relatively dry climate, while our methods are the better in relation to our damp atmosphere. Some works managers, of great experience, regard an excess of sulphur as a "good preservative."

Apart from the familiar ordinary steam pan, the daylight press, and the autoclave press, there are methods of hot curing, some abandoned, some still in use, which are not so well known. These are, for instance, the various dry heat devices more or less on the principle of the Waddington stove (in which proofed cloth passes over a series of rollers in a closed, heated chamber, the time of passing the material being so regulated as to effect a cure) for garments and footwear, in which air under pressure is the heating medium; similar processes in which, instead of air, an inert gas (such as carbonic acid) is used at normal or high pressures. Then there is the Fowler vulcaniser, which, with a view to uniform vulcanisation and the prevention of the formation of blisters, is fitted with a device for eliminating all dissolved gases from the boiler feed. Continuous processes of various types and for different purposes have been tried, and some are working well, particularly in comnexion with spread goods, hose, and belting. I have seen descriptions of continuous vulcanisers for wrapped or moulded tyres in which the tyre enters a long heated chamber by way of a trap, passes forward slowly, and emerges fully cured at the far end through a second trap, but I have no experience personally of them. The continuous curing of small articles, particularly of non-moulded goods, represents a difficult problem. In this connexion the Eddy process (described in H. C. Pearson's work on "Rubber Machinery") is not without interest.

Great strides have recently been made in regard to the control of the heat and of pressure during, and also of the length of the cure. Not only do we possess practical devices for automatically recording the temperatures and pressures throughout the process and showing when the vulcaniser was set and blown off, but we are also able automatically to adjust and control these most important factors in workshop practice.

Direct Vulcanisation

The various processes of direct vulcanisation with sulphur may be sub-divided as follows :—

(1) Ordinary hot cure, using a mix containing sulphur as such. The goods may be cured :—(*a*) in live steam.—In moulds ; in chalk ; wrapped ; suspended ; semi-cured (press or steam) in moulds, and finished off in chalk or otherwise. (*b*) In the (ordinary daylight) press (steam-heated).—In moulds or frames ; semi cured in moulds. (*c*) In the autoclave press (steam-heated).—In moulds or frames. (*d*) In electrically-heated moulds or presses. (*e*) In hot air.—Suspended or standing in or passed through the vulcaniser slowly. (*f*) In an atmosphere of an inert gas. (*g*) By solarisation. (*h*) Water or oil cures.—The goods, in moulds or wrapped, are heated beneath the surface of the liquid.

(2) Sulphur bath cure.—The goods are dipped into and maintained below the surface of molten sulphur. Excess of sulphur is subsequently removed by means of caustic soda.

(3) Accelerated hot cure : (*a*) The mix contains inorganic accelerators, such as magnesia, lime and litharge. (*b*) The mix contains organic accelerators. (*c*) A combination of (*a*) and (*b*). (*Note*.—The methods used are substantially as under (1), but there must be a readjustment of heats as well as of time, and usually of sulphur.)

(4) Hot curing in solvents.—The mix is "dissolved" in a solvent and the solution heated in a pressure vessel by means of steam, or in a suitable container immersed below the surface of a liquid of high boiling point.

(5) Accelerated curing in the cold. (*a*) To solutions or cements of suitable composition, accelerators and activators are added in sufficient quantity to produce—within a reasonable time—vulcanised jellies. (*b*) A mix, containing an organic base capable of forming an active dithio-carbonate, is exposed to the vapours of carbon bisulphide in the cold.

(6) Curing in the cold by means of ultra-violet rays.—"Solutions" are subjected to the action of ultra-violet rays.

Indirect Vulcanisation

The indirect methods similarly classified are :

(1) Hot cure.—Accelerators containing sulphur of which sufficient is split off at curing temperatures to produce vulcanisation. (2) Cold curing by means of gases : (*a*) The goods are exposed alternatively to SO_2 and H_2S ; sulphur in *statu nascendi* is formed and brings about vulcanisation. (*b*) "Solutions" containing suitable quantities of the gases are mixed.

Methods of curing with substances other than sulphur may be sub-divided under :

(1) Cold curing with sulphur chloride.—The goods are passed through or dipped in a solution of S_2Cl_2 in a suitable solvent. Or the goods are brushed over with a similar solution.

(2) Vapour curing with sulphur chloride.—The goods are exposed, in a suitably constructed chamber, to vapours of S_2Cl_2, or more frequently to vapours of the latter somewhat diluted by the vapours of a solvent.

(3) Curing with selenium.

(4) Curing with benzoyl-peroxide and other organic oxidising agents. (With regard to (3) and (4) it is doubtful whether the curing effect is directly comparable either with sulphur or sulphur-chloride vulcanisation.)

Discussion

MR. ROGERS agreed with the author's suggestion that manufacturers should bring the factory to the accelerator. His experience, however, had been that the majority of the accelerators now on the market were very difficult to control. Perhaps this might be due to the plant used, but he felt that the difficulty could be solved if chemical manufacturers would give the rubber manufacturer an accelerator which would give a perfect cure under standard conditions. He did not altogether agree with Dr. Schidrowitz in his statement that American manufacturers used less sulphur than British manufacturers. In this connexion he had found that rubber treated in a sulphur bath possessed great elasticity while its keeping properties were remarkable.

MR. FORDYCE JONES said that if American manufacturers used less sulphur than we did it applied, he thought, to the better quality goods. The cheaper qualities came with not only a bloom but with almost a crust of sulphur. Although American manufacturers seemed to have made no attempt to desulphurise their cheaper products they were certainly lasting.

DR. H. P. STEVENS said Dr. Schidrowitz was an accelerator enthusiast and his own enthusiasm ran in the same direction. While he did not think that an accelerator on the lines suggested by Mr. Rogers would come into immediate use, it seemed to him that manufacturers who were progressive enough to study the matter and adapt their processes to the present accelerators would benefit considerably thereby. Referring to perishing either by hardening or softening, as he had usually found that perished goods became hard and brittle, he would like to hear the author's experiences with softening in vulcanised rubber.

MAJOR SMITH asked whether Dr. Schidrowitz could say when vulcanisation definitely ceased.

MR. MOTE asked if he could throw any light on the amount of sulphur required for perfect vulcanisation.

DR. CLAY said the molecule of rubber was so complex that it could be treated in hundreds of different ways. He was struck by the fact that even with the best of the present-day methods of vulcanisation the life of rubber was very short. He thought that if rubber goods had a longer life the manufacturers would eventually benefit by it. They must realise that there was money in a scientific investigation of this subject. In this connexion he pointed out that financial aid in regard to extra plant and laboratories at the Northern Polytechnic would materially assist such investigations.

After referring to the empirical methods which had been followed in the rubber industry, MR. FRANKLIN said rubber manufacturers were interested in accelerators, but they were also a little frightened of them. They saw new accelerators being advertised almost every day, and the trouble of the small manufacturer was to find the most suitable accelerator for use in various compounds. He had not had a very large experience with accelerators, but he thought that until they were standardised they would not come into general use in small factories.

DR. PORTEOUS found that where cable rubbers were under-vulcanised they perished by softening, whereas if they were over-vulcanised they became hard and brittle.

DR. SCHIDROWITZ, in reply, said no one would expect a manufacturer to use an accelerator or a process without a proper preliminary trial. His own experience of rubber manufacturers was that while they were too timorous in theory, they were too venturesome in practice. Accelerators were being used on a large scale in America, and works practice there was about eight years ahead of ours; these facts alone should be sufficient proof of the immense importance of the organic accelerator. He had found that, properly used, with the minimum proportion of sulphur, accelerators varied remarkably little in effect. In regard to the question of the re-milling of waste, manufacturers were in the habit of making up stock sufficient to last for several weeks; they should only make enough to last for one or two days. He had encountered perishing by softening in tyres, water-meter rings, cables, &c., but, adverting to what Dr. Porteous had said, where rubber was in contact with copper, under-curing was fatal. There could be no definite answer to a question as to when vulcanisation ceased; it was a function of temperature and conditions. The amount of sulphur used also depended on conditions. Where 4 or even 5 per cent. of sulphur had previously been used he was now using 2 per cent or less, with satisfactory results. He, personally, preferred to work with a minimum of sulphur.

Clarification of Varnish

The use of Super-centrifugal Force

IN a paper before the Oil and Colour Chemists' Association on Thursday, January 12, Mr. A. H. Keable discussed the application of super-centrifugal force to the clarification of varnish and the dehydration of oils, especially in relation to the use of the Sharples centrifuge, made by the Sharples Specialty Co. Two types of the machine are made, one known as the laboratory type, which generates a centrifugal force equal to 41,250 times that of gravity, and a commercial type which develops a force equal to 17,000 times that of gravity. This super-centrifugal force is obtained by arranging the bowl or rotor to revolve at a speed, in the first case, of 40,000 revs. per min., and in the second case, of 17,000 revs. per min. The machine has already been applied to the clarification of varnish, lacquers, enamels and the separation of immiscible liquids.

A brief review was given of the development of methods of clarifying varnish and the advantages of the Sharples centrifuge were enumerated. A much greater capacity was claimed for the use of super-centrifugal force over the ordinary filtration method, whilst the time occupied was considerably less. Further, it was essential that some varnishes must be tanked for a long period to "age," in order that they might be in a condition to be placed on the market, but the use of super-centrifugal force reduced these long periods of tanking. The author expressed some doubt whether these long periods of ageing were necessary, quoting a case in which a spar varnish was required in a hurry. The batch was settled for three months and filtered and then allowed to settle for a further three months. After this period, six months in all, the varnish was found to be in as good a condition as that formerly tanked for twelve months. The case was inquired into, and the explanation arrived at for this acceleration of ageing was that whilst ageing or oxidation was proceeding, colloidal particles were formed, the presence of which retarded the process of ageing. By removing these colloids from time to time, ageing was maintained at its maximum capacity. If there was anything in this theory it would seem that in order to speed up the process of ageing it was necessary to remove from time to time the colloidal precipitate which presumably was formed by oxidation.

Centrifugal clarification could include not only cases where solids were lighter than the liquid but also where both types were present in a simple liquid or complex emulsion. When the solids were of greater density than the liquid, they would be deposited in the inside periphery of the bowl; on the other hand, when they were lighter, they would be driven to the top or inner surface of the vertical column of liquid. This method of clarification was new to the varnish industry in this country, but a super-centrifuge was regarded as a necessary part of the equipment of every modern varnish works in America. Without giving complete details, the author mentioned that the cost of clarifying varnish by this method was ¼d. per gallon treated against 2d. for the ordinary filtration method.

Dealing with the dehydration of oils by the Sharples centrifuge, the case of water gas tar oil was mentioned as an extremely complex substance, which had been satisfactorily separated, the recovered oil containing less than ¼ per cent. of moisture. This was done in a day or two, whereas there were cases in which water gas tar oil had been in a settling tank for twelve months with little or no signs of appreciable separation. It was added that the Sharples centrifuge could be applied to many other substances than varnish and oils.

In the course of discussion, Dr. Morrell thought the author had made out a very strong case for the general efficiency of centrifugal force in clarifying varnishes. There was a difficulty with regard to the dehydration of oils, which had also been mentioned. In reply to a question as to the life of an ordinary machine of the Sharples type, Mr. Keable stated that these machines had been running in America on crude petroleum dehydration work for seven or eight years. They were worked by coolies with very little knowledge of machinery. The life in the ordinary way would be from five to six years before any renewals would be necessary. Mr. Haines said he had had experience of the commercial type of this machine with linseed oil. It would not, of course, remove the mucilage —that must be done by preliminary heating to about 400 or 450° F. When that had been separated from the oil, the centrifuge did its work perfectly. The cost of the running of the machine was remarkably small.

Safeguarding of Industries Act

Calcium Carbide Inquiry Adjourned

THE inquiry into the complaint that calcium carbide has been improperly excluded from the list of articles chargeable with duty, which has been prepared by the Board of Trade under Part I. of the Safeguarding of Industries Act, was resumed on January 14, when evidence was head *in camera* as to the costs of producing calcium carbide in this country, after which the public were admitted.

Sir Duncan Kerly, K.C. (for Allen Liversidge, Ltd.), opened the case against the complaint. The case turned, he said, on the reading of the words "synthetic organic chemical" in the schedule to the Act. It was suggested that if the home industry were protected by the imposition of an import duty on calcium carbide then the complainants would be able to continue the home industry. Those instructing him took the view that a duty could never sufficiently help the complainants, because in Norway, for instance, calcium carbide was produced by utilising water power. His clients, who manufactured 34 per cent. of the whole of the calcium carbide used in this country, thought that if a duty were imposed supplies would be obtained from Canada, and it would not affect the home trade. The referee had to interpret the phrase in the Act, namely, "synthetic organic chemical.',

Standard of Purity

Sir Duncan suggested that calcium carbide was not a chemical. The evidence already given had shown that calcium carbide was not manufactured by skilled chemical processes. The standard of purity of calcium carbide was 80 per cent., and he suggested that there was no material difference between the manufacture of calcium carbide, as they had had it explained, and blast furnace processes.

Counsel then examined the problem of whether or not calcium carbide was an "organic" chemical. A number of tests had been given as being generally applied by chemists, and which were described in text-books as the usual tests for determining whether or not a substance was organic. There were some substances, however, which were regarded as organic, which would not answer all, or most, of those tests. Having regard to the general answer that calcium carbide gave to all those tests, there should be no difficulty in writing it down as not an organic chemical. There was the test of heating calcium carbide in a test tube, and it had been admitted that there were some organic substances which would stand a good deal of heat. Again, although organic substances were generally unstable, Mr. Ballantyne, the chief witness for the complainants, had been able to suggest one or two which were different. Organic substances, too, were generally soluble. Then there was the fact that organic substances formed chains or rings, and although Mr. Ballantyne had not suggested any organic compound which was not either in a chain or in a ring, he did agree, Sir Duncan believed, that calcium carbide was not a member of a chain or a ring. As to his contention that even if calcium carbide were an organic chemical it was not a "synthetic" organic chemical, a contention to which he attached considerable importance, Sir Duncan said that in the Act the word meant an artificial compound, devised to serve uses which were previously served by natural compounds or extracts, and also, by an extension of that meaning, newly-invented members of synthetic groups. It did not include all artificially produced compounds, and he submitted that before the inquiry had arisen nobody would have described calcium carbide as synthetic, because the whole idea of substitution for a natural product was absent.

Continuing, counsel said that furnace products were some of the antitheses of synthetic organic chemicals, and calcium carbide was a furnace product, the process of manufacture being purely a heat process. It had no relation to any generally accepted organic compound, except that it produced acetylene. Calcium carbide could not be purified by the usual organic methods of distillation, re-crystallisation or precipitation.

Properties of Carbides

He then touched briefly on the suggestion that had been made that the carbon was the more important element in calcium, which he disputed. Carbon could be found in all carbides, but they were not all capable of being used for the production of acetylene. There were many which could not give acetylene, and, among others, he instanced aluminium carbide, iron carbide and duranium carbide. Therefore he contended that the complainants' case broke down. He claimed that it was the energy of the reaction between the calcium and the oxygen which resulted in the production of acetylene.

Mr. Douglas Hogg, K.C., said that his case, for the Acetylene Corporation of Breat Britain, and for the Norwegian manufacturers, was in its essentials the same as that made by Sir Duncan Kerly.

Mr. James Swinburne, F.R.S., then gave evidence, and was examined by Sir Duncan Kerly. It was wrong, he said, to consider academic definitions in order to decide whether or not calcium carbide was an organic chemical. They all knew its properties, and they should decide from those whether or not it was organic. Calcium carbide was a furnace product, and organic bodies, as a rule, were not furnace products. It would not char or distil when heated, neither was it soluble in the solvents that frequently dissolved organic bodies. It was hard, whereas organic solids were not. Again, it would conduct electricity, and electrical conductivity without decomposition was really a property of the metals. He also mentioned density and opacity, and all these properties he had enumerated were inconsistent with calcium carbide being organic. Also, it was not organic in the sense that the carbon was the most important element; the main chemical reaction in the formation of acetylene was the formation of calcium oxide, and therefore the calcium was most important.

The inquiry was again adjourned.

Safeguarding British Glassware

Public Portion of Inquiry Concluded

THE committee which is inquiring into an appeal made under Part II. of the Safeguarding of Industries Act, that the duty of 33⅓ should apply to domestic, illuminating and mounting glassware imported from Germany and Czecho-Slovakia, completed its public sittings on Monday, when supplementary evidence was given by Mr. J. D. Harward, on behalf of the Flint Glass Manufacturers' Association.

With regard to cost of materials, Mr. Harward gave figures of the pre-war and post-war prices of sand, lead, fuel, potash and soda obtained from eleven British firms. Since he had last given evidence, wage reductions had been agreed upon, which had resulted in the prices of glassware being reduced from 130 per cent. to 115 per cent. above pre-war.

Information and invoices with regard to relative prices in 1914 of British and foreign glassware were laid before the committee *in camera*. As to the ability of English manufacturers to produce domestic, illuminating and heat-resisting glassware in bulk supplies, the witness replied to the evidence given by the opponents to the complaint, and described at some length the efforts which had been and were being made by manufacturers here to supply.

Mr. A. E. Bassett (Chance Brothers, Ltd.) also replied to evidence given for the opposition.

Sir Arthur Colefax, K.C., for the China and Glassware Section of the London Chamber of Commerce, maintained that there was no importation of electric lamp bulbs from the countries concerned. As far as the evidence went, there had been a bigger percentage increase in the price of imported goods than the 130 per cent. on the British price, on which he had based his case. He had no doubt that efforts were being made to equip British factories with the plant which would enable them to meet the demands, but the purpose of the inquiry was not to bring an industry into existence, or to nurture it at the outset; it had to deal with an established industry.

Mr. F. Watkinson and Mr. C. G. Brooks having given supplementary evidence, it was announced that there would be no further public sittings.

The State and Overseas Trade

DEALING with the functions of the State in relation to the development of overseas trade, Sir Norman Hill expressed the opinion, at a recent meeting of the Oxford University Liberal Club, that it could best help matters by refraining from all intervention. Intervention might, he thought, be successful on a national commercial basis, but on an international basis it was quite impossible. Whatever form the intervention might take, the fact remained that the present commercial system, resulting from generations of experience and work, was a system framed to meet the needs of the individuals, and its driving force was derived from the needs of the individual.

December Trade Returns

Smaller Imports and Exports

THE Board of Trade returns for December last, which have now been issued, indicate, as stated in THE CHEMICAL AGE last week, a decline in imports and exports when compared with the figures for November. Compared with November, 1921, imports are less by £3,946,714; exports, by £3,520,098; and re-exports, by £615,608. A similar comparison between the figures for December, 1920 and 1921, shows decreases in imports of £57,375,027, in exports of £37,255,773, and in re-exports of £3,495,465. Taking the totals under each heading for the two years, the following declines are noted in the latter year: Imports, £845,901,668; exports, £631,272,987; and re-exports, £115,701,259. The position, however, is not quite so bad as the figures would seem to indicate, as lower prices account for a large proportion of the decreases.

Chemicals and Drugs

With the exception of bleaching materials, red lead, sodium nitrate, cream of tartar, and zinc oxide, imports of chemicals during December were considerably larger than in November; in the majority of cases the quantities were double those imported in the previous month. Detailed figures of the increases are given below, with the November figures in parentheses, the amounts being in hundredweights, unless otherwise stated: Acetic acid (including acetic anhydride), 243 tons (156); tartaric acid (including tartrates not elsewhere specified), 2,221 (709); borax, 4,100 (2,025); calcium carbide, 55,946 (50,598); crude glycerine, 2,280 (535); distilled glycerine, 503 (254); nickel oxide, 4,135 (2,000); potassium nitrate, 8,288 (7,396); and sodium compounds, other than nitrate, 11,571 (3,843). The decreases, similarly compared, were: Bleaching materials, 2,542 (3,919); red lead, 1,701 (2,707); sodium nitrate, 163,061 (222,008); cream of tartar, 412 (1,300); and zinc oxide, 390 tons (461).

Recovery in Sodium Compounds

Exports of chemicals during December were, on the whole, better than they were in November. Tar oil, creosote, &c., which in November reached the phenomenally low figure of 28,672 gallons, is more than doubled, and benzol and toluol stand at over 5,000 gallons after a total of nil exported in the previous month. Although exports of sodium carbonate and sodium compounds, not here mentioned, show a slight decline, the other compounds, notably sulphate and caustic, have materially increased. The following figures show in detail the products the exports of which show increases over the November figures; the latter are given in parentheses, and the amounts are in hundredweights unless otherwise stated: Sulphate of ammonia, 12,318 tons (7,408); benzol and toluol, 5,274 gallons (nil); carbolic acid, 7,880 (6,350); naphthalene, 1,813 (1,456); tar oil, creosote, &c., 70,853 gallons (28,672); copper sulphate, 2,491 tons (710); crude glycerine, 2,051 (5); sodium caustic, 116,089 (88,688); sodium chromate and bichromate, 3,484 (2,415); sodium sulphate (including saltcake), 79,297 (24,381); and zinc oxide, 140 tons (53). The following show decreases: Sulphuric acid, 857 (1,165); tartaric acid, 283 (518); ammonia chloride (muriate), 268 tons (443); bleaching powder, 9,135 (14,276); naphtha, 1,471 gallons (2,799); coal tar products not elsewhere specified, 17,265 (20,383); distilled glycerine, 2,316 (4,633); potassium chromate and bichromate, 1,628 (2,540); potassium nitrate, 943 (970); sodium carbonate (including soda crystals, soda ash and bicarbonate), 358,108 (360,583); and sodium compounds, other sorts, 58,248 (61,497).

Dyes and Dyestuffs

While the total weight of dyes and dyestuffs imported during December was 1,268 cwt. less than the November figure, alizarine shows a considerable decrease, while coal tar dyes other than alizarine and synthetic indigo were 1,912 cwt. ahead of the previous month's imports. Synthetic indigo stands at 63 cwt. as against nil in November; coal tar dyes (other than alizarine and synthetic indigo), 3,619 cwt. against 1,707; and natural indigo, 66 cwt. against 17 cwt. Decreases are indicated in intermediates (including aniline oil and salt and phenyl-glycine), 4 cwt. against 29, alizarine, 12 cwt. against 1,401; and cutch, 2,456 cwt. compared with 4,334. There was a further decline in the export of dyes and dyestuffs during the month, the total being 9,161 cwt. as against 9,792. To this total coal tar products contributed 5,921 cwt. against 5,955; and other sorts were 3,240 cwt. against 3,837.

Imports of painters' colours and materials were substantially greater, the comparative figures for December and November being: Barytes, ground, 35,251 cwt. (29,614); white lead (basic carbonate), 9,201 cwt. (6,394); and painters' colours, &c., other sorts, 41,138 cwt. (33,600); exports under this heading, at 78,922 cwt., were 2,170 cwt. more than in the preceding month.

Scientific Instruments and Glassware

Scientific illuminating, optical, &c., glassware was imported to the extent of 56,058 cwt., valued at £176,214, as compared with 45,643 cwt., to the value of £149,458, imported in November. Exports amounted to 1,829 cwt., of the value of £32,514; the previous month's total was 2,209 cwt., valued at £39,334. During December we imported 89,218 gross of glass bottles and jars valued at £85,957 (compared with 76,645 gross, valued at £76,756), and exported 22,840 gross, of the value of £35,440, as against 29,137 gross, valued at £47,405.

During December we imported £19,119 worth of complete scientific instruments and apparatus (except electrical), the total being made up as follows: Germany, £8,030; France, £2,710; United States of America, £3,251; and other countries, £5,128. Exports under this heading amounted in value to £79,321. As in the two previous months, British India was our largest individual customer.

Coal exports were 715,298 tons more at 4,309,162 tons, worth £5,365,961.

Experiments with Activated Sludge

Mr. E. V. EVANS, the chairman of the London section of the Society of Chemical Industry, presided over a meeting of that section on Monday, January 16. Owing to illness, the authors of a paper on "Further Experiments with Activated Sludge" were absent and it was read by Dr. Calvert.

THE CHAIRMAN said the paper was an exceedingly important one, and the committee of the section had asked that it should be dealt with at an early date.

DR. CALVERT said the paper described experiments to ascertain the fertilising value of activated sludge, following up the many others that had already been made. The object of the experiments was to find out (1) whether the activated sludge process recovered more of the nitrogen in sewage than the older methods of sewage purification; (2) whether the nitrogen recovered in the sludge was in a form available for plant food; (3) what was the source of the high nitrogen content in activated sludge. The inquiry was undertaken at the request of the Ministry of Agriculture in order to test the fertilising value of activated sludge on a large scale and to obtain information on the points mentioned above. For that purpose it was necessary to have a small plant actually working and under direct control, and it was fortunate that there was space for this purpose at the Harpenden sewage works, the laboratory experiments being carried out at Rothamsted. Part of an existing tank was adapted to the process at the Harpenden sewage works. A detailed description of both the laboratory and the practical experiments was given in the paper, and from the former it was shown, as the result of dealing with varying percentages of sludge, under varying conditions, that varying percentages of nitrogen are recovered according to the period of aeration, but that the percentage only changed within very small limits, however extreme the alteration in the conditions. It seemed strange, the authors pointed out, that the nitrogen content should vary within such small limits. Two, among other conclusions, were that there was a larger amount of nitrogen recovered from activated sludge compared with other methods of purification, and that the extra quantity was derived from the ammonia of the sewage.

A description was given of the plant used in the practical experiments. The results of these experiments confirmed those obtained in the laboratory experiments, and some figures were given comparing the amount of ammonia recovered from activated sludge with the amount in the case of sludge with other methods of purification. Much depended upon the nature of the sewage being treated, but in the case of the Harpenden sewage it was definitely established that the amount of nitrogen recovered in the case of activated sludge was appreciably greater than in the case of precipitation or septic tanks. That was proved by experiments in the field in the growing of crops. A noticeable feature, however, was that the amount of nitrogen available decreased if the activated sludge was stored before use, a point of practical and commercial importance to sewage purification works, inasmuch as the sludge cannot always be disposed of immediately.

Carriage of Hydrogen Peroxide

Judgment for Defendants in Breach of Warranty Claim

On January 12, in the King's Bench Division, Mr. Justice Horridge heard an interesting action brought by the Great Northern Railway Co. against the L. E. P. Transport and Depository, Ltd., of Long Acre, London, W.C., over the carriage by the plaintiff railway of oxigine water in glass carboys. The case for the plaintiffs was that this was a concentrated solution of hydrogen peroxide, that it was measured by the volume of gas it gave off, and was usually in strengths of 10, 12 or 20 volumes, but a foreign firm by adding sulphuric acid had a concentrated solution up to 100 volumes. It was a highly corrosive article, and a quantity was sent from Zurich to Tilbury and thence by the defendants over the plaintiffs' railway to Luton, the goods being described as oxigine water in carboys. The stoppers of some were destroyed by the liquid, and certain carboys were overturned and the liquid damaged some hat bodies that were carried in the same trucks. The plaintiffs had to compensate the owners and now sued the defendants.

Mr. Douglas Hogg, K.C., for the plaintiffs, said their case was that the sending of goods in this way implied a warranty that they were not dangerous. He understood the liquid was known as "Perhydrol." The defence set up was that there was no breach of warranty and that the goods were received by the defendants as common carriers and that they were not liable.

Mr. Eustace Hills, K.C., for the defendants, said this "Perhydrol" was a solution of hydrogen peroxide and the latter was in the non-dangerous list of the railway company's schedule. They could have said anything over 10 or 20 volume was dangerous but they had not done so.

Mr. Leonard Archbutt, chief chemist to the Midland Railway, said the carriage of hydrogen peroxide solution had been a traffic carried on in carboys for many years, and until this case he had never heard of the transit of 100 volume strength in carboys in this country. He found through experiments on hat felt fabric with 20 volume strength and with Perhydrol that the former bleached the fabric but did not destroy its character. Perhydrol of 100 volumes destroyed the fabric and caused great shrinkage.

Mr. Justice Horridge, giving judgment, said the plaintiffs' case was that there was an implied warranty by the defendants that the goods should not be dangerous. This solution might be harmless, and it was classified by the railway company among non-dangerous goods as hydrogen peroxide. Whether it was harmless or not depended on the strength of the solution and everybody called in connexion with the railway company had said they would not expect a solution that would give off more than 20 volumes of oxygen, whereas this solution had over 100 volumes. He was satisfied the solution would cause serious damage to organic matter, and that it did damage these hoods. The question arose if there was a warranty by the defendants as to the goods not being dangerous. He was of opinion the plaintiffs had to carry the goods because of their statutory position, and there was a corresponding warranty by the defendants that the goods were not dangerous. He decided the goods were dangerous and that there was a breach of the warranty. It seemed to him, however, the railway company would only be liable to the owner of the felts in regard to negligence, therefore the railway company could not succeed here as they had not shown they were responsible to make the payment. It was either a voluntary payment or one made in respect of their own negligence; therefore there must be judgment for the defendants, but as the costs had been mainly incurred on the issue of whether the goods were dangerous he would say the defendants must have the ordinary costs and the plaintiffs the costs of the issues on which they had succeeded.

Finsbury Technical College Old Students' Association

The following officers have been elected by postal ballot for the present year:—

President: W. G. Head, M.I.Mech.E.; Vice-Presidents: Professor G. T. Morgan, F.R.S., A. J. Chapman, F.I.C., F. H. Masters, O.B.E., W. J. Tennant. Members of Council: J. H. Coste, F.I.C., Harley F. Knight, F.I.C., W. W. Bradfield, C.B.E., E. W. Moss, E. S. Conradi, E. G. Walker. Hon. Auditors: L. M. Clark, A.I.C., F. R. C. Rouse. Hon. Treasurer: W. Bernard Thompson, "Elleray," Regent Road, Altrincham, Cheshire. Hon. Secretary: H. P. Guy, 74, Silver Street, Edmonton, London, N. 18.

Chemical Analysis in the Foundry

In a lecture upon "The Solution Theory of Alloys," with special reference to cast iron, given before the Lancashire Branch of the Institution of British Foundrymen, on Saturday, January 14, Dr. F. J. Brislee said the clear understanding of the nature of cast iron was the key to progress. The facts could best be elucidated by the aid of the microscope and the pyrometer and chemical analysis. The methods of thermal analysis, which depended upon the rate of cooling of the same quantity of each alloy under similar conditions, showed the proportions of the components and phases which separated during the cooling, and the eutectic composition was determined by making a series of melting point determinations of alloys of varying mixtures. The eutectic composition had always a fairly definite and characteristic structure and the separation or disappearance of a phase would be clearly evident. The composition of each alloy must be settled by analysis. It would be inaccurate to rely upon the composition from the mixture fused. The variables in all classes of work upon alloys in the foundry were temperature, composition, rate of cooling. The composition was liable to vary because of loss due to oxidation and unknown composition of scrap metal, but by the careful use of analysis the composition could be kept constant.

In the discussion several members complained that even when an analysis was obtained there was no certainty that it would represent the bulk of the material supplied. The differences were sometimes very great. Dr. Brislee replied that steel makers bought iron of a standard composition, and the same thing could be done for the founder, who should not be expected to work with materials of unknown quality.

Purification of Mercury

Mercury which has become contaminated with other substances is usually cleaned either by distillation or filtration, combined, where necessary, with a treatment of the mercury with nitric or chromic acid to oxidise other metals present. According to Professor C. Harries in an article in the *Zeitschrift für Angewandte Chemie*, these methods fail in the cases of tin and lead, which the author removes by heating the mercury for several hours in a large flask to a temperature of 150°C. Air is simultaneously blown into the mercury through a glass tube extending about 1 cm. below the surface of the metal, which is kept well agitated. A scum of oxide collects at the surface and is filtered off; the treatment is then repeated until no further scum is formed. A final purification by distillation follows. The scum may contain small globules of mercury which are recovered by digesting the scum with hydrochloric acid.

Company Formed to Exploit New Fibre

In accordance with the requirements of the Stock Exchange, particulars are published for public information only, of the Arghan Co., Ltd., 9 and 11, Fenchurch Avenue, London. The company was formed to cultivate "Arghan," a fibre discovered by Sir Henry Wickham. A healthy stock of plants, the announcement states, has successfully been established in the Federated Malay States, from which it is proposed to develop extensive areas by means of subsidiary companies. The analysts to the Federated Malay States Government, and other experts have certified "Arghan" as being distinctly superior in tensile strength to every other fibre of its class. The company has received an offer for the purchase of the first three years' output.

Importation of Foreign Dyes

In a letter to the *Manchester Guardian*, Mr. H. Beckett of J. M. Beckett & Son, chemical manufacturers, of Biddulph, states that his firm recently applied for permission to import 1 ton of Lithol Fast Scarlet B.N. This, he states, was refused, "and we were told to buy a Monolite Fast Scarlet from the English makers. The price of the Lithol Scarlet is 9s. per lb., and that of the British make 16s. per lb. The consequences" continues Mr. Beckett, "of their refusal are: 1. It increases the cost of the 9½ tons of manufactured lake colour £84 per ton. 2. Our customer has cancelled the order and will buy from some other country."

General Election and Trade

By Ernest J. P. Benn

INDUSTRY and business are at the mercy of the politicians, irrespective of party. The time has arrived when business people, as such, in sheer self-defence are bound to throw off their old disinterest and to take an active part in the selection of candidates and members for the next Parliament. Fortunately this is possible without infringing the rule which bars party politics from business. All the candidates who will presently be appealing for support, with the only exception of the Socialists, will explain to us how deeply interested they are in the question of economy. We shall have a reproduction of the celebrated Westminster election in every constituency; Liberals, Tories, Coalitionists, Independents, or those weird followers of special parties of their own, will all vie with one another in explaining how they, and they alone, represent the only principles upon which true economy can be founded.

The business community, if it would only take the matter seriously, is strong enough to turn this extraordinary position to great advantage. It can at least see that whatever may be the party colour of the next majority at Westminster, the members who form that majority are seriously impressed, not only with the need of economy, but with the good results which can come from economy. There is even some hope that the Labour Party may be impressed with the possibilities of a policy of economy.

Although we have innumerable trade organisations there does not seem to be one among them which has thought it worth while to tackle this question of economy and taxation in a detailed and logical way. All those who have authority to speak for industry have told us that taxation must be reduced before trade can revive, but beyond that general statement very little has been said. The Socialists, and for that matter many other brands of politicians take all such statements as *ex parte* and continue to calculate how they can go on collecting taxes and relieving such distress as becomes troublesome. The direct method of the dole appeals so much more strongly to the simple political mind than the indirect method of sound economics. Besides, no politician can get any credit out of wages paid by ordinary employers, while there is much political credit to be obtained through the medium of the dole. The Southwark election taught us that the candidate who will bid higher than any other in the matter of unemployment pay is bound to gain in any industrial constituency. Business men know that the more there is collected and distributed as dole, the worse will employment become, but the business men do not appear so far to have thought it worth while to take the trouble to reduce this obvious truth to such a basis that the public and even the politician could be expected to understand it.

Let us try and reduce the matter to figures. Taxation, during 1921, stood at the following rates:

Income Tax, 6/- in the £.
Excess Profit Duty, 80 per cent.
Corporation Tax, 5 per cent.
Rates, from 15/- to 30/-.

Let us suppose that for 1922 those figures were reduced as follows:

Income Tax, 4/6 in the £.
Excess Profit Duty, Nil.
Corporation Tax, Nil.
Rates, reduced by 5/-.

That is quite a possible suggestion, it is indeed freely hinted that the Coalition organisers, on the strength of the Geddes report, will recommend a reduction of income tax to 4/6. The excess profit duty has already gone, the corporation tax has produced very small results and is admitted on all hands to be a ghastly blunder: finally, there is no local authority in the land which could not reduce rates by 5/- in the £ if the question of economy were tackled in that drastic manner which the circumstances demand.

The simple question which every business man should ask himself is this.—Supposing that taxation and rates were reduced in the manner suggested, how far should I be in a better position to offer employment to the unemployed? If the comparison with 1921 is made as suggested, the business community could, if it would, reduce the matter to simple figures. There is no reason why every business man should not take his rates and taxes for 1921, calculate how much he would have saved had they been at the new rate, and from the figures thus secured arrive at an estimate as to his ability to employ. If, for instance, the new scale would involve a reduction of £10,000 in the public demand upon a given company it would not be difficult for that company to say that it could spend that money in such a way as to involve the employment of an additional 1,000 people. Similarly, the small tradesman who on the new scale would save say, £100 a year, might very well be able to take on the two extra assistants who have constantly asked him for jobs, but who, so far, he has felt himself unable to employ.

The saving in rates and taxes, however, means a great deal more than the direct employment of labour by the people who are spared part of their present burden. It at once creates further employment, and that by the most direct method. If the extra wages means extra business, that again makes further demand upon somebody. In short, a sovereign spent by way of business means a great deal more employment than a sovereign spent through the Chancellor of the Exchequer. The new rates of taxation suggested above would mean that in 1922 the business community would have at their disposal certainly not less than 250 millions which, last year, was taken from them. There are something less than 2 million registered unemployed. It is surely conceivable that with 250 millions to spare trade would be able to absorb 2 million extra workers.

I throw out the suggestion in the hope that the readers of this journal will write me on the subject. Benn Brothers, Ltd., owning nine trade papers, are in an unique position to test the feeling of the country on a question like this. We could, if it were thought desirable, conduct a sort of plebiscite of our nine industries from which statistics could be framed, which would take this question out of the realm of argument and speculation and bring it down to arithmetic. I should be glad, therefore, if the readers of THE CHEMICAL AGE would be so good as to write to me and say whether, if some simple form were devised, they would be willing to go into their figures for 1921 and state their opinion as to the effect upon employment of reduced taxation in 1922.

D

Defining a Fine Chemical

Views of Nottingham Chemists

AT a meeting of the Nottingham Section of the Society of Chemical Industry, held on January 11, at University College, Nottingham, a discussion took place in regard to definitions in connexion with the Safeguarding of Industries Act. The opinion was expressed that these definitions should have been made before the Bill became law. There was a very long list of substances in Class I., and the consumers of these were already suffering from an anticipatory rise in prices and from the holding-up of other substances in order that the customs officials might have them analysed.

Mr. F. H. Carr said that Mr. Cyril Atkinson, the Official Referee, was desirous that the Society of Chemical Industry should attempt to make the required definitions. The case for the exclusion of santonine had been adequately stated, but there had been no opportunity to prepare the case for its inclusion as a fine chemical. This award would certainly cause great trouble. If a synthetic substance were to be classed as a chemical and an identical, or almost identical, substance (for example, camphor adrenalin) were to be excluded, then the same substance was by definition both a chemical and not a chemical. If the definition were based on chemically reactive properties, then coal, air, would be included as chemicals, but barium sulphate, bismuth carbonate and ether (solvent) would be excluded. Mr. Richmond proposed a definition based on the method of preparation and included, in chemical processes, those which effected change of state, such as fractional distillation. Santonine should certainly be classed as a fine chemical, so also should heavy chemicals like sodium bicarbonate and sulphuric acid, which had been brought to a high degree of purity for special purposes. Mr. Carr emphasized the view that the source or method of preparation should not affect the definition of a chemical. Mr. J. M. Wilkie agreed with this view. The meaning given to synthetic was rather partial, since natural products had also been synthesised (by nature).

After further remarks by Dr. Prideaux, Dr. Firth, Messrs. J. H. Dunford, J. W. Waugh, S. J. Pentecost and H. Calam, it was decided that a sub-committee should be asked to draft resolutions for circulation with a view to further consideration.

From Week to Week

Mrs. A. Grosse, who has just returned from Brazil, claims to have discovered a new radium mine there.

MR. H. F. HOLDEN, of St. John's College, Cambridge, has been re-elected to the Benn W. Levy studentship in biochemistry.

MR. J. GRIFFITH has been appointed head of the department of agricultural chemistry in the University College of North Wales, Bangor.

At the Battersea Polytechnic, London, yesterday (Friday), Mr. W. K. Simmons gave the first of a series of twelve lectures on the "TECHNOLOGY OF WAXES."

The death has occurred suddenly at his residence in Portobello, of MR. ALFRED NICHOL, who, from 1888 to 1906, carried on the Portobello Paper Mills.

A considerable amount of SULPHUR AND RAW RUBBER was destroyed by fire on Monday at the premises of the Compagnie Transatlantique, Bordeaux.

Lectures on "Dyeing: Ancient and Modern," will be given by PROFESSOR A. G. PERKIN at afternoon meetings of the Royal Institution on February 16 and 23.

The death has occurred, at the age of thirty-nine, of MR. R. M. CARRUTHERS, secretary to C. H. Parsons & Brother, Ltd., soap manufacturers of Ashby-de-la-Zouch.

On Wednesday, shareholders of Van den Berghs, Ltd., unanimously confirmed the APPOINTMENT OF SIR W. TOWNLEY as director in the place of the late Lord Ebury.

It is reported that the Institute of Patentees has been approached by an inventor who claims to have DISCOVERED AN ALLOY which will make aluminium acid-resisting.

At a recent meeting of the council of the Society of Chemical Industry it was announced that DR. R. F. RUTTAN, the president of the society, hoped to be in England in May next.

The Council of the Institute of Chemistry hope that the first award of the MELDOLA MEDAL may be made at the annual general meeting of the Institute on March 1 next.

Duties derived under the SAFEGUARDING OF INDUSTRIES ACT, which came into force on October 1 last, brought in a total revenue of £58,769 for the three months to December last.

Interesting descriptions of Nigerian life are given in letters from MR. W. HULME LEVER, which are published in the current issue of *Progress*, the monthly house organ of Lever Brothers, Ltd.

The hearing of the complaint under Section 1 (5) of the Safeguarding of Industries Act, in regard to CREAM OF TARTAR, TARTARIC ACID and CITRIC ACID has been postponed until February 4.

Applications are invited by February 2 for the appointment of COUNTY ANALYST FOR MIDDLESEX. Particulars may be obtained from Mr. E. S. W. Hart, Guildhall, Westminster, London, S.W. 1.

All the fabrics displayed at an exhibition at the Victoria and Albert Museum, South Kensington, under the auspices of the British Institute of Industrial Art, are guaranteed to be BRITISH DYED.

At a meeting of the West of Scotland Branch of the Association of Mining Electrical Engineers, in Glasgow, on January 14, Mr. J. A. Brown read a paper on "TRANSFORMER AND SWITCH OILS."

THE BUSINESS carried on hitherto by the British, Irish and Colonial Department of the Ateliers de Construction Oerlikon, has been transferred to Oerlikon, Ltd., Oswaldestre House, Norfolk Street, Strand, London.

We regret to record the death on January 13 of MR. B. P. LASCELLES, F.C.S., who was a science master at Harrow from 1885 to 1901. Youngest son of the late Hon. Arthur Lascelles, he was sixty-two years old.

The London and South-Eastern Counties Section of the Institute of Chemistry will hold an EXHIBITION OF APPARATUS other than glassware in the laboratories of the Institute on Wednesday, January 25, from 6 p.m. to 10 p.m.

At an inquest on Monday on the three VICTIMS OF AN EXPLOSION on January 12 at the Faversham factory of Curtis's & Harvey, Ltd., the jury returned a verdict of accidental death, and attached no blame to anyone.

In a letter to the *Times*, Dr. C. CARPENTER announces the readiness of the Institution of Gas Engineers to organise a searching investigation into the conditions associated with the greater percentage of carbon-monoxide in domestic gas supplies.

Mr. J. H. Young presided over a joint meeting of the Glasgow Sections of the Society of Chemical Industry and the Institute of Chemistry at Glasgow on January 12, when a discussion on the TEACHING OF CHEMISTRY was opened by Professor R. M. Caven.

Mr. F. J. Bloomer, F.I.C., presided at a meeting of the South Wales Section of the Institute of Chemistry, held at Swansea on Monday, when the first of two papers on the "LOW TEMPERATURE CARBONISATION OF COAL" was read by Mr. T. Eynon Davies, B.Sc., A.I.C.

At a meeting of the Huddersfield Technical College Chemical Society on January 13 the presidential lecture was given by Mr. F. Rice on "CHEMISTRY IN WARFARE." Mr. Rice outlined the progress of chemistry in war, and indicated the development of modern explosives.

An action was commenced on Tuesday in the King's Bench Division by E. E. Wilmot, a boilermaker, against the Anglo-American Oil Co., Ltd., alleging negligence by the ompany in regard to AN EXPLOSION in a barge in 1920. The hearing which was resumed on Wednesday was again adjourned.

PROFESSOR H. E. ARMSTRONG has consented to deliver the first Messel Memorial Lecture at the annual meeting in Glasgow of the Society of Chemical Industry. The medal to be presented to Professor Armstrong will, if practicable, be made from the platinum dish bequeathed to the Society by Dr. Messel.

We regret to record the death at "Ferns," Alderley Edge, Cheshire, on January 15, of MR. EDWARD HOPKINSON, M.P. Born in 1859, he joined the firm of Mather and Platt, Ltd., of Salford, in 1884, and ultimately became vice-chairman of the board of this undertaking. He was also a director of the Chloride Electrical Storage Co., Ltd.

At the ANNUAL MEETING of the Sheffield Association of Metallurgists and Metallurgical Chemists last week, the following officers were elected: President, Dr. T. Baker; vice-president, Mr. L. Dugby; secretary, Mr. J. Evans; council, Messrs. G. R. Bolsover, T. P. Colclough, J. H. S. Dickinson, J. H. G. Monypenny, H. Rollin and H. B. Moorhead.

On Friday, at King's College, London, Professor W. H. Perkin in the chair, PROFESSOR R. ROBINSON, F.R.S., gave the first of a course of three lectures on "Orientation and Conjugation in Organic Chemistry from the Standpoint of the Theories of Partial Valency and of Latent Polarity of Atoms" Admission to the remaining lectures, on February 17 and March 17, at 5 p.m. is free without ticket.

We regret to record the death at Morpeth on Monday of DR. J. F. BOTTOMLEY, managing director of the Thermal Syndicate, Ltd., of Wallsend. Educated at Glasgow University and later at Heidelberg, he invented the process for the manufacture of glass from pure silica, for the working of which the Thermal Syndicate was formed. Dr. Bottomley, who was in his forty-eighth year, leaves a widow and two children

In connexion with the recent removal of their offices from Bradford to the Lighthouse Chemical Works, Dewsbury, J. C. OXLEY'S DYES & CHEMICALS, LTD., announce that, following out their centralisation scheme, their telephone numbers and telegraphic address have been changed as follows:—Telephone Nos. 365-6-7 Heckmondwike (3 lines), private exchange. Telegraphic Address:—"Oxdychem, Dewsbury." The above changes also relate to their associated company, The Heckmondwike Chemical Co., Ltd., East Calder Chemical Works, Heckmondwike.

At the next meeting of the Glasgow Section of the Society of Chemical Industry, on January 27, 1922, a contribution from the Chemical Engineering Group of the Society on "POTENTIAL DEVELOPMENTS IN REFRIGERATION," by Dr. W. R. Ormandy and Mr. E. C. Craven, will be read. The chairman of the group, Mr. J. Arthur Reavell, M.I.M.E., will preside. Copies of the synopsis of the paper, and further details of the meeting, can be had from the hon. secretary of the Group, at 24, Buckingham Street, Strand, London, W.C. 2, or from the hon. secretary of the Glasgow Section, Dr. Cranston, Royal Technical College, Glasgow.

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Patent Literature

Abstracts of Complete Specifications

172,667. Detergents and Bleaching Compounds or Agents. J. F. Moseley, 62, Whitby Road, Fallowfield, Manchester, and N. Drey, Platt Abbey, Rusholme, Manchester. Application date, June 8, 1920.

An improved detergent and bleaching compound is produced by mixing 10 parts of per mono-sulphuric acid (H_2SO_5—Caro's acid), per di-sulphuric acid ($H_2S_2O_8$) per mono-carbonic acid (H_2CO_4), or per di-carbonic acid ($H_2S_2O_6$) with 20 parts of sodium bicarbonate and sesqui-carbonate or carbonate and 2.5 parts of a chlorinated hydrocarbon such as trichlorethylene, tetrachlorethane or carbon tetrachloride, or a chlorinated paraffin, or a hydrogenated hydrocarbon such as decahydronaphthalene.

172,682. Intermediates and a Dyestuff of the Anthraquinone Series, Manufacture of. F. W. Atack, of the British Alizarine Co., Ltd., Trafford Park, Manchester, and C. W. Soutar, Chestney House, St. Andrews, Fife. Application date, August 5, 1920.

When 2-aminoanthraquinone suspended in acetic acid is treated with a limited amount of chlorine gas it is found that the 3-chloro derivative, having a melting point of about 221°C., is obtained. This substance can be treated with bromine to obtain a new compound 2-amino-1-bromo-3-chloro-anthraquinone. This bromo compound may be condensed by means of a copper salt into a dyestuff, which apparently consists of 3 : 3′-dichloro-anthraquinone-1 : 2 : 2′ : 1′-N-dihydroazine. The glacial acetic acid may be replaced by nitrobenzene, to which sodium carbonate or other neutralising agent may be added. The three operations of chlorination, bromination and condensation may be carried out consecutively in the same solvent without isolation of the intermediates. Several examples are given.

172,685. Calcium Carbide, Production of. Alby United Carbide Factories, Ltd., Winchester House, Old Broad Street, London, E.C. 2, and J. W. Mitchley, 22, Seagate Road, Hunstanton, Norfolk. Application date, August 10, 1920.

The process is for producing an agglomerate for use in the manufacture of calcium carbide. A mixture of limestone and pitch, heavy oils, or light hydrocarbons, is charged into a retort which is heated above 700°C., preferably 850°C., for at least thirty-six hours. The proportions of the agglomerate should preferably be such that it may be converted directly into calcium carbide without any additions. The agglomerate is broken up, and if required to be stored, is protected from the action of moist air by spraying the hot material with a mixture of hot tar and pitch or by treating with coal or coke oven gas to deposit carbon on the material.

172,688. Naphthalene, Hydrogenation of. G. Schroeter, Luisenstrasse 56, Berlin, N.W. 6, and Tetralin G.m.b.H., Behrenstrasse 5, Berlin, W. 8. Application date, August 11, 1920. Addition to 147,474.

Specification No. 147,474 (*see* The Chemical Age, Vol. III., p. 429) describes a process of hydrogenating naphthalene by heating it with hydrogen under pressure above 100°C. in contact with a metal catalyst such as finely-divided nickel. It is now found that an oxide, hydroxide or salt of nickel is more effective as a catalyst. Nickel formate, borate or carbonate are suitable catalysts, and with the carbonate naphthalene may be converted into tetrahydro-naphthalene in about half the time necessary with finely-divided nickel. Compounds of other catalytic metals, such as cobalt, iron, manganese and copper may alternately be used, mixtures of nickel, cobalt and copper compounds being particularly suitable.

172,711. Rubber Compositions, Manufacture of. W. Feldenheimer, 20, Holborn Viaduct, London, E.C. 1, W. W. Plowman, 83, St. Leonard's Road, East Sheen, Surrey, and P. Schidrowitz, 57, Chancery Lane, London, W.C. 2. Application date, September 7, 1920.

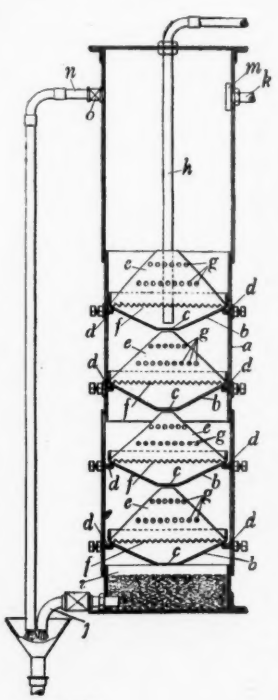
The process is for the manufacture of rubber compositions containing clay. The rubber and clay are mixed with a water-soluble soap in the dry state, such as an alkali oleate, or the equivalent of such soap such as a dry alkali and oleic acid. An excess of alkali such as anhydrous sodium carbonate may also be added. The proportions of sodium carbonate and soap are each about 3 per cent. The clay used is preferably a colloidal clay such as that obtained by dispersion of the clay in a fluid medium by adding a peptising (deflocculating) reagent such as ammonia, caustic soda or sodium carbonate. The sodium carbonate is preferably ground with the clay, the treated clay introduced into the mixer, and the oleic acid added gradually during mastication. The mixture may be vulcanised at 40 lb. pressure in 45-75 minutes, yielding a product having a high breaking strength and good distensibility.

172,754. Vulcanisation of Materials Relating to Rubber, Process for. S. J. Peachey, 5, Yew Tree Road, Davenport, Cheshire, and A. Skipsey, Red Lea, Scarborough. Application date, September 22, 1920. Addition to 129,826.

The process is for vulcanising balata or gutta percha. In treating solid balata or gutta percha a thin film of the material (0.2-0.5 mm.) is exposed to an atmosphere of sulphur dioxide for ten minutes, then exposed to the air to remove adsorbed gas, and then exposed to an atmosphere of sulphuretted hydrogen for thirty minutes, when the sheet is found to be vulcanised. A similar process may be applied to a layer spread on fabric, or to an impregnated fabric The gases may be used in the reverse order. Alternatively the raw material is dissolved in carbon disulphide and then saturated with sulphuretted hydrogen. A solution of sulphur dioxide in benzene is then added and the mixture stirred and allowed to stand. The vulcanised material sets in the form of a gel from which the solvent may be evaporated. The vulcanised material has an increased tenacity and resistance to heat, but a diminished solubility in solvents of the raw material, *e.g.*, vulcanised balata and gutta percha are insoluble in chloroform and benzol respectively.

172,783. Tar and Oils, Means for Facilitating the Separation of Liquor from. S. Glover, Olive Mount, St. Helens, Lancs; J. West, Alton Lodge, Park Crescent, Southport, Lancs; and West's Gas Improvement Co., Ltd., Albion Works, Miles Platting, Manchester. Application date, October 2, 1920.

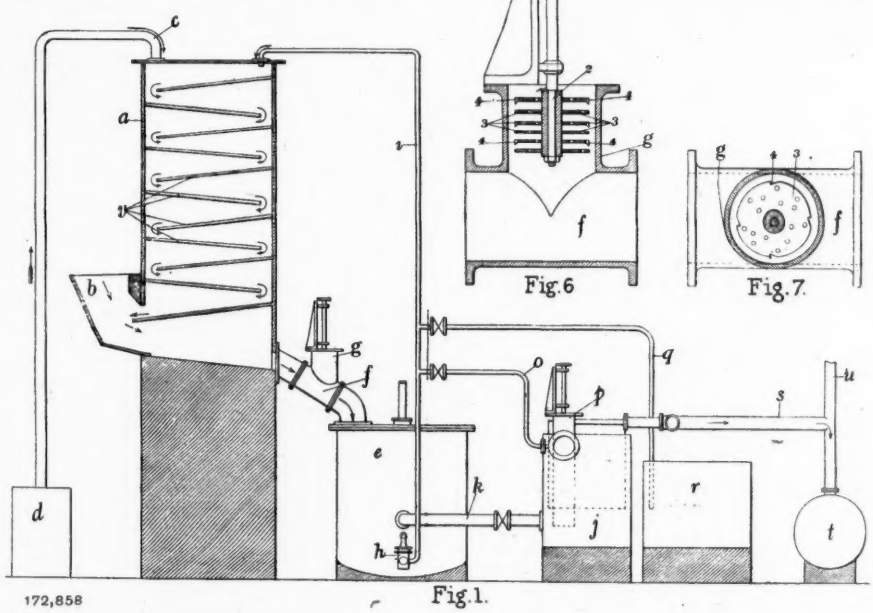
Tar obtained in the destructive distillation of coal and like carbonaceous materials contains suspended globules of liquor, especially when the retorts are steamed. The object is to obtain a tar freer from this suspended liquor, which it is usually impossible to remove except by distillation. The crude tar is fed through a pipe *h* into a tower *a* containing a number of superposed conical trays *b* having central openings *c*. The trays are supported on screwed studs *d* projecting from the sides of the vessel. Each tray supports a hollow conical member *e* having a central opening, and also a number of perforations *g*. The lower edge of the conical member is serrated at *f*. The crude tar spreads over the surface of the cones and trays and the liquor is separated and rises to the overflow passage *k*. Any tarry matter lighter than water rises to the surface and is drawn off by the pipe *n* at a slightly higher level. A sump *i* is provided at the bottom of the tower from which tar is withdrawn by the pipe *j*. Other draw-off pipes may be provided at different levels in the tower to draw off different fractions of the tar and oils.



172,783

172,858. Sodium Thiosulphate, Manufacture of. L. Hargreaves and A. C. Dunningham of Electro Bleach and By-Products, Ltd., Middlewich, Cheshire. Application date, December 1, 1920.

The process is for manufacturing sodium thiosulphate by the action of sulphur on sodium sulphite, the proportions of these substances and water present being such that the sodium thiosulphate solution obtained is sufficiently concentrated to crystallise out without evaporation. The impurities which usually occur, such as sodium chloride, sodium sulphite, sodium sulphate and sodium carbonate are practically insoluble in the hot concentrated solution. In the present process the sodium sulphite required is simultaneously produced by the action of sulphur dioxide on sodium carbonate in the presence of a solution of sodium thiosulphate. Sodium carbonate, sulphur and water are fed through the hopper *b* to the base of the tower *a* and sulphur dioxide passes from the sulphur burner *d* through the pipe *c* to the top of the tower which contains a series of baffle plates *v*. The solution containing the reacting substances in suspension is supplied by the pipe *i*. The mixture passes by the pipe *f* to the digester *e*, and that portion which is not passed into the pipe *i* passes through the pipe *k* to a filter tank *j* which is connected to the pipe *i* by the pipe *o*. Another branch pipe *q* is connected to the pipe *i* so that concentrated thiosulphate solution may be drawn directly into the filters *j*, *r*, through the pipes *o*, *q*. The filtered solution is finally drawn into the tank *t*. Some bisulphite may be produced in the upper part of the tower *a*, in which all the sulphur dioxide is absorbed, but the bisulphite reacts with sodium carbonate producing sodium sulphite and carbon dioxide before the mixture enters the digester. Fresh raw materials are supplied at the inlet *b*.



172,858 Fig.1.

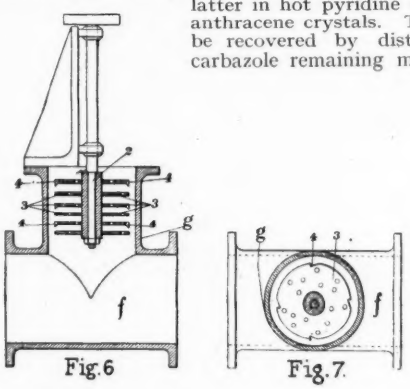


Fig.6

Fig.7

When the process is started, all the carbon dioxide is absorbed in producing bicarbonate after which an evolution of gas commences. A deficiency of alkali in the system results in the production of sodium bisulphite, which is undesirable owing to its acid reaction, while a large excess of alkali results in the production of sodium bicarbonate or sesqui-carbonate crystals which tend to prevent circulation of the liquid. If the digester *e* is jacketed, very little additional heat is needed owing to the heat liberated during the absorption of sulphur dioxide in the tower *a*. A disadvantage in this process is the production of froth which may occur in the digester and which seriously reduces the output. This is prevented by the use of a froth-destroying device *g* on the pipe *f*. A spindle 2 carries one or more perforated discs 3 having small vanes 4 at their peripheries. The rotation of these discs breaks up the froth in the pipe *f*. A similar device is employed at *p*. The filter *j* comprises a number of vertical filter plates consisting of sheets of cloth clamped over wire gauze frames, the internal space being placed under vacuum. The solid residue of sodium carbonate, bicarbonate, sulphate, and sulphur is removed from the filter plates and returned to the system. The circulation of the liquor through the filter tank is effected by means of a centrifugal agitator in the digester *e*. Impurities such as sodium sulphate gradually accumulate in the system and may be removed by digesting the excess of solid substances to a minimum, and removing them by special filter *r*. The soluble and insoluble impurities may be removed without loss of sulphite or sulphur by using an excess of these substances alternately.

172,864. Anthracene and Carbazole, Separating and Purifying. A. Kagan, 10, Clarence Square, Brighton. Application date, December 8, 1920.

Crude anthracene is dissolved in warm cresol, xylenol, or the like, and the solution cooled. The crystallised anthracene is removed, and washed with petroleum ether. The cresol may be replaced as a solvent by the mixture of phenol and cresols known as 60 per cent. phenol. The anthracene thus obtained may be freed from carbazole by dissolving the latter in hot pyridine and removing the anthracene crystals. The pyridine may be recovered by distillation, and the carbazole remaining may be purified by crystallising from hot toluene and finally subliming. This contains product 96-98 per cent. of pure carbazole while the anthracene is of 89 per cent. purity and a yield of 96 per cent. is obtained.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 144,663 (T. Goldschmidt Akt.-Ges.) relating to process for modifying the physical characteristics of solid substances produced by chemical reactions, *see* Vol. III., p. 214; 147,051 (J. I. Bronn) relating to treatment of coke oven gases, *see* Vol. III., p. 404; 147,470 (F. D. S. Robertson) relating to obtaining volatilisable metal oxides, *see* Vol. III., p. 429; 148,139 (Dr. H. Bucherer) relating to formaldehyde and phenols, *see* Vol. III., p. 455; 150,744 (L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude) relating to synthesis of ammonia, *see* Vol. III., p. 634; 151,925 (R. D. George) relating to decomposing heavy hydrocarbon oils into lighter oils, *see* Vol. III., p. 713.

International Specifications not yet Accepted

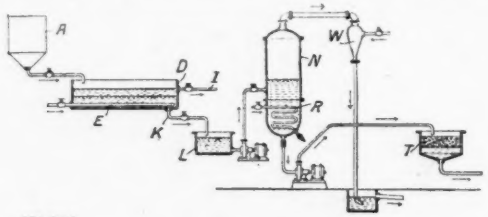
171,670. Electrolysis. C. E. Holland, 30, Church Street, New York. International Convention date, November 13, 1920.

The apparatus is for precipitating finely-divided coal and other organic material such as hydrocarbons, from suspension in water. A tank is lined with hard rubber, glass, or other

insulating material, and contains a series of parallel electrodes of carbon or metal which are suspended from the top and connected alternately to the positive and negative terminals. The water to be treated flows into the tank near the bottom and overflows over one side at the top into a discharge channel. A voltage of 3 to 5 volts and current density of 1 to 1.5 amperes per sq. ft. may be used, and the precipitated coal, &c., is directed towards a central outlet at the bottom by a false bottom which slopes downwards from the sides towards the centre.

171,684. SULPHURIC ACID. W. H. Simonson, 935, East Thirteenth Street, Brooklyn, New York, and O. Mantius, 38, Church Street, Eaglewood, N.J., U.S.A. International Convention date, November 19, 1920.

The process is for purifying and concentrating sulphuric acid from the sludge acid obtained in refining petroleum. The sludge acid passes from a tank A to a tank D where steam or hot water is admitted by a pipe E to dilute the acid to 28°-30° Bé. and thus separate the hydrocarbons.



171,684

The mixture is allowed to settle, the upper layer is drawn off by a pipe I, and the lower layer consisting of dilute acid by a pipe K. The acid is pumped from a tank L to a steam-heated evaporator N. Exhaust steam is first passed through the pipe R and then steam at 80-100 lb. per sq. in. A partial vacuum is maintained in the evaporator N by a jet condenser W, so that the acid is concentrated at about 270°-290° F. The acid is filtered in the vessel T, and if not sufficiently concentrated, fuming sulphuric acid is added to bring the strength to 66° Bé. for use again.

171,693. TANNING. Gerb-und Farbstoffwerke H. Renner & Co., 20, Billhorner-Canalstrasse, Hamburg, Germany. International Convention date, November 15, 1920.

Soluble or colloidal arsenic compounds are used as tanning agents. A suspension of an insoluble compound of arsenious, arsenic, sulpharsenious, phenylarsenic, or diphenylarsenic acid or arsenophenol is treated with a large proportion of an alkali salt, so that the required colloidal solution is obtained. In a modification, a heavy metal salt of arsenious or arsenic acid is rendered soluble by treating with a free organic sulphonic acid of a hydrocarbon or with a synthetic tanning agent obtained by condensing and sulphonating a phenol and hydrocarbon.

LATEST NOTIFICATIONS

173,735. Process for purifying saccharine juices or liquids. Soc. Ricard, Allenet et Cie. January 6, 1921.
173,742. Method of coating magnesium and magnesium alloys. Backer, C. B. January 4, 1921.
173,750. Partial combustion methods for treating aliphatic hydrocarbons. Byrnes, C. P. January 6, 1921.
173,757. Manufacture of salts for sulphonated coumarone resins. Gerb-und Farbstoffwerke H. Renner & Co. Akt.-Ges. January 8, 1921.
173,774. Processes for producing pure titanic acid from titanic ores. Chemische Werke vorm. Auerges. January 8, 1921.

Specifications Accepted, with Date of Application

146,167. Tanning agents, Manufacture of. Gerb-und Farbstoffwerke H. Renner & Co. Akt.-Ges. July 7, 1915.
148,750. Artificial tanning agents, Manufacture of. H. Renner and W. Moeller. July 31, 1919.
151,000. Dyestuffs, Manufacture of. R. B. Ransford. (*L. Cassella & Co., Ges.*) August 27, 1920.
151,984. Ammonia from cyanides, Process for the production of—during heating in the presence of water. C. T. Thorssell and H. L. R. Lundén. October 6, 1919.
153,574. Calcium cyanamide into urea, Process for effecting the change of. Nitrum Akt.-Ges. November 7, 1919.
156,135. Ammonia, Synthetic production of. L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédes G. Claude. December 30, 1919.
173,242. Oils, Cracking of. R. H. Brownlee and C. F. de Ganahil. June 21, 1920.
173,254. Azo dyes obtained from coniferous resins and their process of manufacture. R. Arnot. July 22, 1920.
173,255. Softening of water, Process for. G. G. Hepburn. July 24, 1920.
173,268. Electrolyte for use in the electro-deposition of metals and metallic alloys. Q. Marino. August 25, 1920.
173,276. Artificial manure or fertiliser. Molassine Co., Ltd., and H. C. S. de Whalley. August 28, 1920.
173,300. Hydrochloric acid, Manufacture and production of. J. Y. Johnson. (*Badische Anilin & Soda Fabrik.*) September 23, 1920.
173,313. Mordants, Manufacture of—and process of dyeing basic dyestuffs on cotton. W. Carpmael. (*Farbenfabriken vorm. F. Bayer & Co.*) September 27, 1920.
173,337. Metals from their sulphides, Manufacture of. E. E. Naef. October 5, 1920.
173,389. Stirrer or mixer. B. C. Low. November 1, 1920.

Applications for Patents

Abbott R. H. S. and Davidson, T. M. Distillation of coal, &c. 1,074, 1,075, 1,076, 1,077. January 12.
Davidson, T. M. Distillation of coal, &c. 1,074, 1,075, 1,076, 1,077. January 12.
Davies, W. E. Carbonisation of coal, lignite, &c. 950. January 12.
Eagar, G. F. F. and Stewart, C. J. Vaporiser devices for liquefied gases. 1,015. January 12.
Evans, L. T. Godfrey and Barton-Wright, E. W. Simultaneous fractionation and distillation of carbonaceous matter by low-temperature carbonisation. 642. January 9.
Farbwerke vorm, Meister, Lucius, & Brüning. Process of preparing arseno-compounds. (Germany, January 13, 1921.) 1,081. January 12.
Goodwin, C. J. Manufacture of oxides of nitrogen and nitric acid. 1,288. January 14.
Gulf Refining Co. Cracking hydrocarbon oils. 1,255, 1,256, 1,257, 1,258. January 14. (United States, January 15, 1921.)
Linde Air Products Co. and Marks, E. C. R. Separation of gaseous mixtures. 688. January 9.
Naugatuck Chemical Co. Processes of vulcanising rubber. 931. January 11. (United States, February 1, 1921.)
Royston, G. Apparatus for neutralising sulphate of ammonia in its wet state. 712. January 10.
Salerni, E. M. and P. M. Rotary retorts for distillation or heat-treatment of carbonaceous, &c., materials. 1,199. January 13.
Standard Oil Co., Inc. Pyrogenetic treatment of hydrocarbon oils. 1,277. January 14. (Holland, January 15, 1921.)
Stewart, C. J. Vacuum-insulated vessels. 1,016. January 12.
Thomsen, T. E. W. Process for obtaining methyl alcohol from residues, &c. 922. January 11.
Warren, A. I. G. Producing metallised surfaces on rubber compounds containing sulphur. 1,030. January 12.
Weiss, J. Process for production of low-temperature tar, semi-coke, and gas from solid carbonaceous materials. 1,069. January 12. (Hungary, January 13, 1921.)

Patents Court Cases

AN order has been issued under Sec. 26 (3) of the Patents and Designs Acts, revoking the following patents: 5545/1912 relating to a process of manufacturing negative electrodes for alkaline accumulators; 72/1914 relating to a process for restoring the activity of a positive electrode mass for alkaline accumulators. Both are in the name of Svenska Ackumulator Aktiebolaget Jungner.

Application has been made under Sec. 24 of the Patents and Designs Acts, 1907 and 1919, for the following patent to be endorsed "Licence of Right": 121,460 (Norsk Alkali, A/S) relating to the electrolysis of chlorides of the alkaline metals.

Inquiry into Powder Works Explosion

IN Edinburgh on January 14, Sheriff Macleod held an inquiry into the recent explosion at Camilty Powder Mills, West Calder, belonging to the Mid-Lothian Gunpowder Co., Ltd., as a result of which Messrs. A. S. Fortune and J. Nimmo, employees of the company, were killed. Mr. A. M. Taylor, manager of the West Calder Powder Mills, said the explosion might have been due to the presence of grit in the powder, a breakdown in the machinery, or a spark from a chimney stack which was close by. After other evidence the jury returned a formal verdict of accidental death, and added a rider stating that they were glad to learn that as a spark might have been one of the possible causes the company had under serious consideration the removal of the boilers to another part of the factory.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

LONDON, JANUARY 18, 1922.

TRADE has again been on the quiet side during the past week, although here and there there are signs of a broadening demand. Values on the whole keep steady, and the undertone is very firm.

The export demand still leaves a great deal to be desired, although it has been better than has been the case of late.

General Chemicals

ACETONE continues in quietly steady demand, and the price is very firm.

ACID ACETIC has been in request for near delivery, and the price has advanced.

ACID CITRIC is again slightly lower, with only a very moderate inquiry.

ACID FORMIC is firmer, and there is not a great deal of material offering.

ACID LACTIC is also firmer and has been in much better demand.

ACID OXALIC continues quietly steady, although the demand has been light.

ACID TARTARIC continues quiet, and the price is nominally without change.

BLEACHING POWDER has been in small demand, but continental competition has not been so pronounced.

COPPER SULPHATE.—There has been more inquiry, but only a very small volume of business has been closed.

CALCIUM CHLORIDE is in moderate request at last quoted figures.

FORMALDEHYDE is only moving off slowly, but the price continues steady.

LEAD ACETATE has been in better request, and the price is slightly firmer.

LEAD NITRATE is in only very small demand, and the price is without change.

LITHOPONE shows a small advance, and the material is comparatively scarce.

POTASSIUM CAUSTIC is in quietly steady request, and the undertone is a shade firmer.

POTASSIUM CARBONATE is dull, and the tendency is weak.

POTASSIUM CHLORATE is moving off in small quantities, and the price is unchanged.

POTASSIUM PRUSSIATE is somewhat scarce, and the price has advanced.

SODIUM ACETATE may be described as a shade firmer, with a small business passing.

SODIUM BICHROMATE has been reduced in price, but only small business is passing.

SODIUM NITRITE is in small request, without change in value.

SODIUM PRUSSIATE continues in request, and the price is again higher. There is, however, little offering on the spot.

ZINC OXIDE has been in better demand, and the price is very firm.

Coal Tar Intermediates

Business during the past week has continued on quiet lines, but there are signs of slight expansion, and a fair amount of inquiry has been received on both home and export account.

ALPHA NAPHTHOL continues uninteresting.

ALPHA NAPHTHYLAMINE has been inquired for, and is firm at last quoted price.

ANILINE OIL AND SALT are on the quiet side, and there are still some resale parcels about at below makers' quoted figures.

BENZIDINE BASE continues to pass steadily into consumption, and there does not seem to be a large amount of resale material on the market.

BETA NAPHTHOL is steady, and a fair inquiry has been received.

DIMETHYLANILINE is slightly easier, with small inquiry about.

DIPHENYLAMINE continues very firm, with only small quantities available in this country. Inquiries have been received for export.

"H." ACID is firm, and secondhand parcels seem practically non-existent.

NAPHTHIONIC ACID is steady.

NITROBENZOL remains unchanged, and continues to pass into regular consumption.

PARANITRANILINE is firm, with no very large stocks available.

PHTHALIC ACID ANHYDRIDE has been inquired for, both on home and on export account.

RESORCIN is featureless.

Coal Tar Products

There is little fresh business doing in coal tar products and prices generally have a downward tendency.

90's BENZOL is selling at 2s. 5d. on rails.

PURE BENZOL is unchanged at 3s. on rails in the North and at 3s. 6d. in London.

CREOSOTE OIL has a very fair inquiry, but at the same time supplies are poor, and prices are steady at 5½d. in the North and 6¼d. to 6½d in the South.

CRESYLIC ACID is quiet but fairly steady at 2s. 1d. on rails for Pale quality and 1s. 10d. on rails for the Dark 95/97 per cent.

SOLVENT NAPHTHA is in poor demand, and is quoted at 2s. 4d. on rails, and there is little business doing at this figure.

NAPHTHALENE is quiet, with poor inquiry and prices are from £5 to £8 for Crude, with Refined at £15 to £17.

PITCH.—There is still an active demand for export, and the market is firm. To-day's quotations are 62s. 6d. to 65s. per ton, f.o.b. London, 60s. f.o.b. East Coast, 57s. 6d. f.o.b. West Coast.

Sulphate of Ammonia

There are no new features to report. The demand is satisfactory, and prices are well maintained.

Current Prices

Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	82	10	0	to	85	0	0
Acid, Acetic, glacial, 99-100%	ton	52	10	0	to	55	0	0
Acetic, 80% pure	ton	45	0	0	to	46	0	0
Arsenic	ton	90	0	0	to	95	0	0
Boric, cryst.	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	1	to	0	2	2
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	10	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	35	0	0	to	36	0	0
Oxalic	lb.	0	0	8	to	0	0	8¼
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst.	lb.	0	7	0	to	0	7	3
Salicylic, Technical	lb.	0	0	10½	to	0	1	0
Salicylic, B.P.	lb.	0	1	4	to	0	1	5
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	0	to	0	3	6
Tartaric	lb	0	1	3	to	0	1	4
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	30	10	0	to	32	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	13	10	0	to	14	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	10
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to		—	

	Per	£	s.	d.		£	s.	d.
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, Chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	14	10	0	to	15	10	0
Nitrate	ton	40	0	0	to	42	0	0
Barium Sulphate, blanc fixe, dry	ton	24	0	0	to	25	0	0
Sulphate, blanc fixe, pulp	ton	15	0	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
" " Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	7	10	0	to	8	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	28	10	0	to	29	0	0
Cream Tartar, 98-100%	ton	120	0	0	to	125	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	81	0	0	to	82	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	4	5	0	to	4	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	6	to	0	2	7
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	42	10	0	to	45	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	27	0	0
Magnesium chloride	ton	10	10	0	to	11	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	61	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	34	0	0	to		—	
Potassium bichromate	lb.	0	0	7½	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Meta bisulphite, 50-52%	ton	112	0	0	to	120	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	9	to	0	0	10
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2	to	0	1	2½
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	3¾	to	0	0	4
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	13	10	0	to	14	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	20	10	0	to	21	0	0
Perborate	lb.	0	1	2	to	0	1	3
Prussiate	lb.	0	0	9½	to	0	0	10
Sulphide, crystals	ton	13	0	0	to	14	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	0	0
Sulphite, cryst	ton	13	0	0	to	14	0	0
Strontium carbonate	ton	60	0	0	to	65	0	0
Strontium Nitrate	ton	60	0	0	to	62	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6½	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102°Tw	ton	21	0	0	to	22	10	0
Zinc Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	38	0	0	to	40	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	18	10	0	to	19	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	2	3	to	0	2	6
Alphanaphthol, refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	2	0	to	0	2	3
Aniline oil, drums extra	lb.	0	1	0	to	0	1	1
Aniline salts	lb.	0	1	1	to	0	1	2
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	6	to	0	5	9
Benzidine, sulphate	lb.	0	5	6	to	0	5	9
Benzoic acid	lb.	0	1	10	to	0	2	0
Benzoate of soda	lb.	0	1	9	to	0	1	11
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	4	9	to	0	5	0
Betanaphthol	lb.	0	1	9	to	0	2	0
Betanaphthylamine, technical	lb.	0	6	0	to	0	7	0
Croceine Acid, 100% basis	lb.	0	3	6	to	0	3	9
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	2	9	to	0	3	0
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	0	10	to	0	1	0
Dinitronaphthaline	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	5	to	0	1	6
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	2	6	to	0	2	9
Diphenylamine	lb.	0	4	3	to	0	4	6
H-Acid	lb.	0	6	6	to	0	7	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	0	to	0	6	6
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	3	3	to	0	3	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	0	to	0	1	2
Orthoamidophenol, base	lb.	0	10	0	to	0	10	5
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	1	6	to	0	1	9
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	10	0	to	0	10	6
Para-amidophenol, hydrochlor	lb.	0	10	6	to	0	11	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	3	6	to	0	3	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled	lb.	0	11	0	to	0	11	6
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	2	9	to	0	3	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	6	to	0	7	9
Salol	lb.	0	2	3	to	0	2	5
Sulphanilic acid, crude	lb.	0	1	0	to	0	1	1
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Potash

FERTILISER manufacturers and merchants are now pressing for the prompt delivery of outstanding orders as buyers are beginning to lay in stocks for the spring season. A good deal of kainit and sylvinite is also required immediately for the winter application, along with basic slag. Muriate of potash has been more in demand recently for the making of compound manures, and there has been some inquiry for small lots of sulphate of potash for horticultural purposes.

The current prices now ruling are almost too good to last. Quotations for two or four-ton lots in bags f.o.r. London are as follows:

	£	s.	d.
Kainit 14 per cent. (K_2)	2	12	6
Sylvinite 20 per cent.	3	12	6
" 30 per cent.	5	12	6
Muriate of potash 50 per cent.	10	10	0
Sulphate of potash 90 per cent. purity	14	10	0

Advices from Alsace state that the potash mines there have been able to conclude a favourable agreement with the fertiliser manufacturers whereby a considerable quantity of the American imports of potash will be obtained from Alsace.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

GLASGOW, JANUARY 18, 1922.

LITTLE of importance can be said of the chemical market during the past week. There were rather more inquiries, but the volume of business placed is still small. Inquiries seem more for the purpose of testing the market than for actual buying. Buyers still have the advantage in prices.

The direct service of cargo steamers recently inaugurated between Hamburg and Glasgow will be watched with interest for its effect on the chemical trade of Glasgow and the West of Scotland. It will obviate the troubles incidental to repeated handling in transhipment, but apparently there is to be no benefit in the matter of reduced through rates.

Continental price lists are being received frequently, and quotations show considerable variations. The export of caustic soda has, for the time being, been prohibited from Germany.

There has been some improvement in the volume of business passing in coal tar and intermediate products for home and export.

In fertilisers, sulphate of ammonia continues to attract attention and supplies are none too plentiful, whilst the very heavy stocks of nitrate of soda exercise a depressing effect on that commodity and still lower limits are looked for.

Industrial Chemicals

ACETONE.—Many inquiries, but no visible supplies. Makers sold up for some time ahead. Price firm at £75 per ton.

ACID, BORACIC.—Crystals, £65; powder, £67 per ton. Few sales to record. Spot prices weak.

ACID, ACETIC (GLACIAL).—Little movement, but some business done around £50 per ton.

ACID, HYDROCHLORIC, 36° Tw.—Very slow. English makers have reduced prices to 9s. to 9s. 6d. per carboy, delivered buyers' works.

ACID, AQUAFORTIS (DIPPING).—In small request at 4¼d. per lb. ex works.

AMMONIA, MURIATE (GALVANISERS).—Quiet. Makers asking £38 per ton, but business possible ex re-sale parcels about £30 per ton.

AMMONIA, SULPHATE.—More active and stocks light. For near delivery, £14 10s. per ton obtainable.

AMMONIA, CARBONATE.—No change. Small sales to regular buyers at 4d. to 4½d. per lb.

BARIUM CHLORIDE.—Continent quoting £18 per ton c.i.f. U.K.

BARYTES.—A little movement. Fine white, £6 per ton. Grey, £4 to £5 per ton at works.

BLEACHING POWDER.—No change. Requirements small. Continent still offering below home price of £14 per ton, but in limited quantity.

COPPERAS (GREEN).—Lower prices offered from 16s. to 23s. 6d. per ton in buyers' and sellers' wagons respectively, ex South Wales works; 40s. per ton in casks ex works.

FORMALDEHYDE, 40 PER CENT. VOL.—Stocks in country before introduction of key industry duty being depleted slowly. To-day's price, £77 per ton ex store.

GLAUBER SALTS (COMMERCIAL).—Considerable stocks accumulated and no demand. Price, £5 per ton ex works.

POTASSIUM BICHROMATE.—Market weaker. Makers' prices now 7½d. per lb. for export.

POTASSIUM CARBONATE.—90/92 per cent., £28 15s. per ton, and 96/98 per cent., £34 5s. per ton, c.i.f. U.K.

POTASSIUM CAUSTIC, 88/92 PER CENT.—Rather easier at £31 15s. per ton, c.i.f. U.K.

POTASSIUM PERMANGANATE (COMMERCIAL).—10d. to 1s. per lb. Small parcels only inquired for.

LEAD, RED.—£39 per ton. } British make; 5 ton
LEAD, WHITE (DRY).—£52 15s. per ton } lots.

LEAD, ACETATE.—Limited inquiry at about £43 per ton.

LIME (DERBY), 96/97 PER CENT.—Offers at reductions on Association prices; 36s. to 40s. per ton delivered buyers' works.

MAGNESITE, GROUND CALCINED.—£14 per ton. Stocks moving slowly.

MAGNESIUM CHLORIDE.—Fused in drums, £18 5s. per ton c.i.f. U.K. Moderate stocks held, but orders light.

SODIUM BICHROMATE.—Makers have reduced prices to 5¾d. per lb. delivered.

SODIUM CARBONATE (REFINED ALKALI 58 PER CENT.) } No change on last
SODA CRYSTALS. } week's prices.
SODIUM BICARBONATE. } Demand slow.
SODIUM SULPHATE 95 PER CENT. }

SODIUM CAUSTIC.—More inquiry for export. Meantime export from Germany barred.

SODIUM CHLORATE, 99/99½ PER CENT.—Offered from Italy at 3d. per lb. c.i.f. U.K., drums free.

SODIUM HYPOSULPHITE (COMMERCIAL).—£12 per ton ex works in casks. Pea crystals in 1 cwt. kegs, £19 per ton. Small demand.

SODIUM NITRATE.—Lower prices are required to stimulate demand. Re-sellers below "Pool" prices are still getting what small business is passing. A large Government order just placed with re-sellers.

SODIUM SULPHIDE, 60/65 PER CENT. CONCENTRATED.—£23 to £24 per ton. Continent offerings slightly higher.

SULPHUR.—Low prices diverting acid makers from pyrites. American 99/99.5 per cent., £5 per ton bulk, ex quay.

SICILIAN THIRDS.—Government surplus now small.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL AND SALT.—Some contracts being placed at the reduced prices of 1s. and 1s. 1d. respectively.

BENZOL.—More on offer, and buyers expecting lower prices shortly. Pure 3s. per gallon; 90's, 2s. 7d. per gallon; and crude, 65 per cent. at 120°, around 1s. 6d. per gallon.

BENZALDEHYDE.—Offered at 2s. per lb., makers works.

BENZIDINE BASE.—Small inquiry; 8s. 6d. per lb. 100 per cent. basis.

BETA NAPHTHYLAMINE.—A little inquiry for export.

DIMETHYLANILINE.—Small inquiry; 2s. 10d. per lb. quoted.

ETHYL ALCOHOL 95/97 PER CENT.—Offered freely from abroad.

META XYLIDINE.—Small inquiry for export; 7s. 9d. per lb. quoted, drums extra.

NAPHTHIONATE OF SODA.—Some inquiry for export; 3s. 3d. per lb. 100 per cent. basis quoted.

NITRO BENZOL.—A few orders placed at 8½d. per lb., drums extra.

PARANITRANILINE.—A few inquiries for home and export. Price 3s. 9d. per lb.

"R" SALT.—A few inquiries for export on the market. 8s. 6d. per lb. 100 per cent. basis asked.

SULPHANILIC ACID.—Inquired for. Makers quoting 1s. 8d. per lb. 100 per cent. basis.

TOLUOL.—Easier in sympathy with benzol; 3s. per gallon asked for Pure, in buyers' tanks.

WOOD NAPHTHA.—Offered freely at 5s. 9d. per gallon ex store, but poor demand.

Institute of Metals

THE annual meeting of the Institute of Metals will be held in London on March 8-9, when ten important papers are to be presented for discussion. At the annual dinner at the Trocadero Restaurant on Wednesday, March 8, lady members, as well as many distinguished guests of the Council will be present. Prior to the March meeting a ballot for the election of new members and student members will be held. The necessary membership application forms combined with an interesting illustrated booklet describing the work of the Institute, and including photographs of all Past-Presidents, can be obtained from the Secretary, Mr. G. Shaw Scott, H.Sc., 14, Members' Mansions, Victoria Street, Westminster, London, S.W. 1, to whom application forms, duly completed, should be sent not later than noon on Wednesday, February 22. A special feature which makes this ballot the most notable of the year, is that persons elected as a result of it secure membership, not for the usual twelve months, but for the extended period ending June 30, 1923, as well as an extra volume of the Institute's *Journal*.

German Chemical Trade Notes

(From Our Own Correspondent.)

Berlin, January 9, 1922.

The increase in dyestuff prices has caused a perceptible decline in the sales of these goods during December. The demand has also slackened in the Austro-Hungarian successive States as well as in Belgium, Holland, Sweden and Denmark. The difficulties which the German dyestuffs industry is meeting from foreign competition has been especially noticeable in the Dutch market. The economic crisis in Italy and Spain still continues to such an extent that in Spain only those branches of industry are fully occupied which are receiving orders from the War Department; Portugal, too, is still in a very unsettled condition. The export of dyestuffs to the Russian border-States has lately increased, although the volume of trade does not approximate to pre-war standards.

That there is some activity in the Esthonian dye industry is shown by the contract recently concluded with the Siemens-Schuckert Werke, Berlin, with respect to deliveries of technical equipment for her factories. Although persistent efforts have been made, no direct business has been done with Russia as yet, and numerous offers to the Russian Trade Commission in Berlin have been without apparent result. Business transactions with the U.S.A. have been very slack during December, and it is felt here they will remain so as long as the import restrictions are in force. Trade with Canada is likewise very small, although a little improvement has been noted recently.

Deliveries on reparation account have not only lowered the returns of all chemical products to the countries concerned but also to many other States, it being alleged that considerable quantities of these goods were sold to former neutral countries at prices which simply spoiled the German market. This problem has now been removed by an agreement which has been concluded between the Wiederherstellungs-ausschuss and German chemical manufacturers, according to the terms of which the Entente will not resell any of the reparation dyes. An additional improvement has been brought about by the removal of the restriction which required the placing of 25 per cent. of the total output at the disposal of the Reparation Commission. The Wiederherstellungskomission has agreed to consider the goods not called for within two months as expired, and in case of need a delivery of even more than 25 per cent, has been promised.

Heavy chemicals are rather neglected as the market is weak and opinions about the near future are very divergent.

Fine chemicals, and especially pharmaceuticals, continue to attract attention, though business is confined to comparatively small parcels for export. Dyestuffs and paint materials met with a rather fair market with fluctuating prices.

The following quotations are given in marks per kilogram (d. = domestic price; e. = export price).

Acids: Acetic 80 % chemically pure, 19.75 mk. d., glacial 25 mk. d., 32 mk. e. Sulphuric, 60° Bé 4.50 mk. e.; 66° Bé 6 mk. e. Alum, powdered, 6.75 mk. d., 8 mk. e.; lumps, 7.90 mk. d., 9.10 mk. e. Chrome-Alum, 21 mk. d., 24 mk. e. Alumina Sulphate, 14 and 15%, 5 mk, e. Barium Chloride, crystallised, 8 mk. d., 10.50 mk. d. Ammonium Carbonate, powdered, 11.50 mk. d., 15 mk. e.; 9.50 mk. e. Bleaching Powder, 80%, 4.30 mk. d., 5.10 mk. e.; 110%, 8 mk. e. Borax, crystallised, 26 mk. d.; powdered, 27.50 mk. e. Calcium Chloride, 90 and 95 %, 3.80 mk. d., 4.40 mk. e.; 70 and 75%, 2.75 mk. e. Copperas, green, 2.70 mk. e.; Copper Sulphate, 98 and 100 %, 7 mk. d., 9.50 mk. e. Epsom Salt, 3.50 mk. e. Glauber's Salt, crystallised, 2 mk. d., 2.40 mk. e. Magnesium Chloride, fused, 5 mk. e. Potassium Carbonate, 96 and 98%, 21 mk. d., 27 mk. e.; 90 and 95%, 10 mk. d.; 80 and 84%, 16 mk. d. Potash Caustic, 88 and 92%, 27 mk. d., 23 mk. e. Caustic Potash Liquor, 50° Bé, 11.50 mk. d., 17 mk. e. Potassium Chlorate, 20 mk. d., 21 mk. e. Salt Cake, 96 and 98%, 3 mk. d., 3.50 mk. e. Soda Crystals, 2.40 mk. d., 4 mk. e. Soda Ash, 96 and 98%, 6 mk. d., 7 mk. e. Caustic Soda, 125 and 128°, 25 mk. d., 22 mk. e. Caustic Soda Liquor, 38 and 40°, 10 mk. d. Sodium Silicate, 36 and 40°, filtered, 1.75 mk. d., 2.75 mk. e. Sodium Sulphide, 30 and 32°, 9 mk. d., 10.25 mk. e.; 60 and 62°, 17 mk. d., 19 mk. e. Sulphur, powdered, 7 mk. d. Zinc Chloride, 14 mk. e. Zinc Oxide, 90 and 92%, 12 mk. and 19 d

Company News

Canada Cement Co.—The directors announce a dividend of $1½ per share, less tax, on the common stock, payable forthwith.

Distillers' Co., Ltd.—An interim dividend for the current year on the ordinary shares of 8s. per share, free of tax, is announced.

John Knight, Ltd.—The share-transfer books are closed from January 18 to January 31, both days inclusive, for the preparation of dividend warrants.

Jurgens, Ltd.—The transfer books of the guaranteed 7 per cent. cumulative participating preference shares are closed from January 17 to 31 inclusive.

Arizona Copper Co., Ltd.—At a meeting in Edinburgh on Tuesday, the proposal to reduce the capital from £755,000 to £715,000 by the cancellation of all the A preference shares was approved.

Burma Corporation.—According to cabled advices the production for the month of December last was lead, 4,034 tons, gross refined lead 3,055 tons, and refined silver production approximately 318,000 oz.

Anglo-Persian Oil Co., Ltd.—The anticipated new issue of capital will, it is understood, take place at an early date. The sum to be raised will be about £4,000,000 and the issue is expected to take the form of ordinary shares and 8 per cent. preference.

Tariff Changes

United Kingdom.—Various alterations in the Import and Export List for 1922 came into effect as from January 1. Among other alterations, the scope of the heading, "Sulphate of alumina (including alum)" will be restricted in future to "Sulphate of alumina (including potash alum and ammonia alum)." A list of export prohibited goods was published in the Board of Trade *Journal*, and includes sulphate of ammonia, basic slag and superphosphate of lime. Open General Licences have, however, been issued, permitting the export to all destinations of sulphate of ammonia, and compound manures having sulphate of ammonia as their only export prohibited constituent. It also permits the export to the Channel Islands of basic slag, superphosphate of lime, and compound manures containing either basic slag or superphosphate of lime.

South Africa.—A rebate of import duty on the following materials used in the manufacture of rubber is now allowed: Pigments, filling agents, and vulcanising accelerators, viz., zinc oxide (zinc white), zinc sulphide, antimony sulphide (yellow and red), alumina, magnesium carbonate, calcined magnesia, lithopone (mixture of zinc sulphide and barium sulphate or of zinc white and barium sulphate), vegetable black, carbon black, Prussian blue, white lead (basic lead carbonate); ebonite powder and emarex (natural pitch); in bulk. Rubber substitutes, viz., vulcanised vegetable oils; in bulk. Rubber compounding oils, viz., aniline oil, rosin oil, and vaseline; in bulk. Rubber solvents, viz., benzene (benzol), coal-tar naphtha, westrosol, westron, carbon disulphide; in bulk. Vulcanising agents, viz., sulphur chloride, in jars of not less than one imperial gallon.

Czecho-Slovakia.—Revised "co-efficients of increase," applicable as from January 1, have been formulated in regard to the import of certain goods. Inquiries as to the rates of duty applicable to any goods on importation into Czecho-Slovakia should be addressed to the Tariff Section of the Department of Overseas Trade, 18, Queen Anne's Gate, London, S.W. 1.

Bengal Calcium Carbide Regulations

H.M. Senior Trade Commissioner at Calcutta has forwarded a copy of the following amendment to the rules for regulating the importation, possession, and transport of carbide of calcium in Bengal, sanctioned by the Governor-General-in-Council: For Rule 5 of Part III. of the said Rules substitute the following as Rule 5: If any carbide of calcium becomes wetted while in the possession of a railway for transport, it shall be destroyed by immersion in deep water. If, however, deep water is not available, the wet carbide of calcium shall be spread out in the open in an isolated position, all precautions being taken to prevent lights being brought near until the material has given off all its gas.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Companies Winding Up Voluntarily

BROTHERS' CHEMICAL CO., LTD. W. Bolton, 46, Pall Mall, Manchester, appointed liquidator.

MANN & COOK (WEST AFRICA) LTD. F. D'Arcy Cooper, 14, George Street, Mansion House, London, appointed liquidator.

Winding-up Petition

RUSSELL OIL & CHEMICAL CO., LTD. A petition for winding-up has been presented, and is to be heard at Royal Courts of Justice, London, Tuesday, January 24.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BEVAN, M. L., Mooriston, chemist. £33 2s. 10d. November 15.

BOWMAN'S WHOLESALE DRUG STORES, Lowther Parade and Rickergate-brow, Carlisle, druggists. £11. 6s. 6d. November 8.

JAMES, E., 56, Oxford Street, Mountain Ash, chemist, &c. £35 10s. 7d. November 7.

SKEAT, C., 609, High Road, Tottenham, chemist. £10 os. 3d. November 10.

STANSFIELD, J. L., Boothfield, Waterfoot, chemical manufacturer. £19 4s. 2d. November 15.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. 2:—

BRITANNIC CHEMICAL CO., LTD., 12, Charterhouse Square, E.C. 1. General merchants and manufacturers, dyers, enamellers, drysalters, &c. Nominal capital, £6,875 in 2,500 10 per cent. preference ordinary shares of £1 each and 17,500 ordinary shares of 5s. each.

COOKE'S EXPLOSIVES, LTD., the Explosives Factory, Penrhndeudraeth, Merioneth. Explosives manufacturers. Nominal capital, £30,000 in 30,000 shares of £1 each.

D. W. SYNDICATE, LTD., 72, Victoria Street, Westminster, S.W. 1. Dealers in and refiners of china clay, peat fuel, &c. Nominal capital, £2,500 in 2,500 shares of £1 each.

F. CARRICK & CO., LTD., Milburn House, Newcastle-upon-Tyne, exporters and importers of coal, coke and products of coal carbonisation, &c. Nominal capital, £100,000 in 100,000 shares of £1 each.

SOUTH BANK BASIC SLAG CO., LTD., Cargo Fleet Ironworks, South Bank Road, South Bank, Yorkshire, slag manufacturers. Nominal capital, £27,000 in 7,000 preference shares of £1 each and 20,000 ordinary shares of £1 each.

Belgian Varnish Sold as British

A RELIABLE authority has reported to the Department of Overseas Trade the practice, on the part of certain sellers of varnish, of selling Belgian-made varnish as the product of fictitious British firms: the reason, frankly admitted, being that there was a superior scope for the British product in this market. The experts have, however, apparently penetrated the deception and have been refusing all but the genuine British article, but the deception has been more successful in the provincial districts. Steps have been taken to put a stop to the practice and exporters who have reason to suspect that their trade is being affected by any such procedure should immediately report the fact to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1

Lord Leverhulme on "Safety First"

SOME proof of the results accomplished by the application of "Safety First" principles was afforded at the annual meeting of the British Industrial "Safety First" Association in London on Monday, Lord Leverhulme presiding. It was shown that in an undertaking dealing with soaps, tallow and oils a decrease in accidents of 59 per cent. had been attained in a two-year membership of the "Safety First" Association.

Lord Leverhulme, who was re-elected President of the Association, said the movement should be supported not only on humanitarian grounds but equally on the grounds of the efficiency of the trade and commerce of the country.

Following the meeting a dinner was held at the Trocadero Restaurant, when Lord Leverhulme, proposing the toast of the Association, said one of the directions in which we wanted "safety first" was in regard to the mental outlook of the workers. There was no more hateful expression to him in the English language than "hands," when used to describe labour. Such an expression did more harm to the relationship between master and man than any question of higher or lower wages.

Among those present were Mr. C. Walton (Lever Brothers, Ltd.), Mr. E. J. P. Benn, C.B.E. (Benn Brothers, Ltd.), Mr. E. B. Hannan (Brunner, Mond & Co., Ltd.), and Mr. R. C. Macdonald and Mr. Gill (South Metropolitan Gas Co., Ltd.).

Government Contracts

THE following were among the Government Contracts let during November:—

WAR OFFICE.—*Acids, Various:* Spencer, Chapman, & Messel, Ltd., London, E. *Mineral Jelly:* Anglo-American Oil Co., Ltd., Purfleet. *Paint in Oil:* Rowe Brothers & Co., Ltd., City Lead Works, Liverpool.

CROWN AGENTS FOR THE COLONIES.—*Blasting Gunpowder.*—Curtis's & Harvey, Ltd. London, E.C. *Lead:* Locke, Lancaster and W. W. & R. Johnson & Sons, Ltd., London, E.C. *Paint:* Humidine, Ltd. London, E. *Tar:* Shields & Ramsay Glasgow.

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).—*Copper Evaporator Coils:* G. & J. Weir, Ltd., Cathcart, Glasgow. *Varnishes:* Blundell, Spence, & Co., Ltd., Hull; Craig & Rose, Ltd., London, S.E.; Griffiths Brothers & Co., Ltd., London, S.E.; Hanger, Watson, & Harris, Ltd., Hull; Jenson & Nicholson, Ltd., London, E.; Naylor Brothers (London), Ltd., Slough; C. W. Waters, Ltd., London, E.C.

HIGH COMMISSIONER FOR INDIA.—*Bitumastic Solution &c.:* Wailes, Dove Bitumastic, Ltd., London, E.C. *Bottles:* Lewis & Towers, Ltd., London, N.E.; Ludford & Co., London, E. *Lead:* Locke, Lancaster, and W. W. & R. Johnson & Sons, Ltd., London, E.C. *Measures, Glass:* Johnsen & Jorgensen Flint Glass, Ltd., London, E.C. *Paint, White Lead:* Brimsdown Lead Co., Ltd., Ponders End. *Sterilisers:* Arnold Sons, London, E.C. *Thermometers:* A. C. Cossor & Son, London, N.; A. Peroni, London, N.

Recent Wills

Mrs. Julie Schintz, of Ottershaw Park, Chertsey, Surrey, widow of Mr. Hans Gaspard Schintz, known as the "Nitrate King" £60,795

Major Frederick Henry Harris, of St. Anthony's Road, Bradford, dye and chemical merchant.. £11,910

Mr. Francis William Passmore, F.I.C., of Stonefield, Bexley Heath, London, consulting chemist.... £10,669

Mr. Charles Ernest Watson, Oxford Road, St. Annes-on-Sea, analytical chemist £2,407

Mr. Arthur Walker, of Oak Lea, Whitehaven, Cumberland, a partner in Walker, Ltd., tanners, chairman of the Whitehaven Brick and Tile Co., and associated with a number of tanning firms in Manchester and Liverpool £228,105

Artificial Disintegration of Elements.

IN connexion with Sir Ernest Rutherford's lecture on "Artificial Disintegration of Elements," to be given before the CHEMICAL SOCIETY on Thursday, February 9, at 8 p.m., it has been decided that visitors will be admitted by ticket only. Fellows of the Society will not need tickets for themselves, but those desiring to bring visitors should apply for tickets to the Assistant Secretary, Chemical Society, Burlington House, W. 1, not later than January 28. No fellow will be allowed more than two tickets.

TRADE GUIDE

CHEMICAL AGE

THE Trade Guide is a compact and handy form of reference to a representative list of firms engaged in various branches of the Industry. In most cases fuller particulars may be found by referring to the displayed advertisement elsewhere.

Acids

SULPHURIC
MURIATIC
DIPPING
BATTERY
NITRIC

OLEUM
(all Strengths)
and
SALTCAKE

SPENCER CHAPMAN & MESSEL, Ltd.
36, Mark Lane, E.C.3.

Acid Resisting Metals

MONEL

Succeeds where other Metals fail.
Acid-resisting-Incorrodible
Bars, Rods, Sheets, Wire
Castings, Forgings

G. & J. WEIR Ltd MONEL DEPT. CATHCART, GLASGOW.

Analytical Reagents

THE BRITISH DRUG HOUSES LIMITED — BDH — LONDON

Research Chemicals
THE BRITISH DRUG HOUSES, LTD.,
Graham St., City Rd.,
LONDON, N.

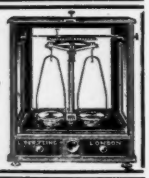
Asbestos

Pioneers of the World's Asbestos Industry

BELL'S UNITED ASBESTOS Co., Ltd.
Southwark Street, LONDON, S.E.1
(Established 1871)

Balances

Oertling
LONDON



Chemical Plant

BENNETT SONS & SHEARS, Ltd.
43, SHOE LANE,
LONDON, E.C.4.

Centrifuges
Autoclaves
Sterilizers, etc.
CHARLES HEARSON & Co., Ltd.
WILLOW WALK, BERMONDSEY, S.E.

Chemical Plant (*Continued*)

CENTRIFUGES
Steam, Belt, Electrical, and Water Driven.
For every class of separation.
Write for new Catalogue No. 39.
T. Broadbent & Sons, Ltd.
Huddersfield.

Carbons

NORIT.
THE decolourising carbon and Refining Agent.
30 Times adsorptive capacity of bone char.
In five grades.
JOSEPH BAKER SONS & PERKINS Ltd.,
Head Offices: Kingsway House, Kingsway, W.C. 2
Telegrams: "Bakers, London."

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O'HARA & HOAR
Chemical Manufacturers
13, Fish Street Hill, E.C.3
COLOURS, CARBON
PUMICE, CHALK.

Deodorising Compound

KUVROL Reg.
Removes Objectionable Smells in White Spirit, Turpentine Substitutes, Lubricating and Fuel Oils, Greases, Distempers, Glues, Etc.
CREPIN & DOUMIN, LTD.,
15, COOPER'S ROW, E.C.3.

Disinfectants

ALL GRADES, PERCENTAGES AND CO-EFFICIENTS
ALSO
LIQUID SOAPS
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83, Broad Street, Camlachie, Glasgow

Drums and Tins

JOHN FEAVER,
TOWER BRIDGE ROAD, S.E.1.
TINS for
PRESERVED PROVISIONS and FOODSTUFFS.
CANS for VARNISH PAINT.
DRUMS & TAPERS for OILS, VARNISH.
Samples and Prices on Application.

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Drying Machines
Automatic & Continuous
Temperature under Perfect Control.
See Advert
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BASFORD NOTTINGHAM

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KESTNER PATENT
EVAPORATORS
ACID ELEVATORS
FANS
EXTRACTORS
CRYSTALLIZERS
Kestner Evaporator & Engineering Co, Ltd
5, Grosvenor Gardens, Westminster, S.W.1.

MULTIPLEX AND SIMPLEX FILM EVAPORATORS.
DISTILLING PLANT.
DRYING PLANT OIL HARDENING PLANT.
BLAIR CAMPBELL & McLEAN Ltd
GLASGOW
MAKERS OF ALL TYPES OF CHEMICAL PLANT.

Filterpresses

P.F.C.
THE RESULT OF 60 YEARS EXPERIENCE
PREMIER FILTERPRESS Co. LTD.
FINSBURY PAVEMENT HOUSE, LONDON, E.C.2

S. H. JOHNSON & CO., LTD.
CARPENTER'S ROAD,
STRATFORD,
E.15.
FILTER PRESSES